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GARBAGE

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Just Plain
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Cover photograph by Christopher Harting

Back cover illustration by Terry Allen

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Wanted: Bottle-fed Omnivores in Sneakers

"A magazine covering environmental topics is for environmentalists. Your notion to the contrary is like Field & Stream giving equal coverage to animal rights groups. Screw it. Hunters don't want to read about Bambi. They want deer jerky and winter meat."

THAT'S AN EXCERPT FROM ONE OF the more colorful letters I've gotten warning me that, since only environmentalists read environmental magazines, I'm shooting myself in the foot every time I stray from the party line. "Whose side are you on?!" others sputter.

I have been guilty of using the word "environmentalist" loosely. "Environmentalist" is an imprecise word. Does it mean "activists on behalf of the environment," or does it signify a whole host of assumptions about age and diet and musical taste, or does it refer to the vast majority (70-90%, depending on the poll) of Americans who say they are sympathetic to environmentalism? Overwhelmingly, people are pro-environment, if that means clean air to breathe and water to drink and the opportunity for their great-grandchildren to take a camping trip. But we cannot assume that they hold the same opinions on environmental priorities, on solutions, on technology, on lifestyle choices.

And that's why I disagree with my concerned reader above. His analogy, I think, is not pertinent. Hunters hunt; but environmentalists may work for Greenpeace or NASA. Hunters purchase, register, and learn to use firearms; they venture into unpopulated areas to find and kill game; they know how to make use of the meat. A magazine serving them could make these assumptions, and much of the editorial copy would be service oriented. It's a safe bet that the readers wouldn't want to read anthropomorphized, emotion-stirring articles on animals. They would, however, indeed take

an avid interest in animal-rights activities that impinge on their freedom to hunt.

I stand by my decision to edit for the general reader, rather than cater to the narrowly defined environmentalist. The editors here won't just deliver what "environmentalists want to hear" ... because *we too* are environmentalists, and we have come to a point where we want to get beyond simplistic science and obfuscating rhetoric; we'll listen critically to Du Pont's PR people and Vice President Gore. We assume that others have reached that point, too.

Seems to me you could reclaim a bit of your "friend of the environment" capital by reminding everyone of the ecological benefits of breastfeeding.

You did breastfeed, didn't you? Please say you did.

.....

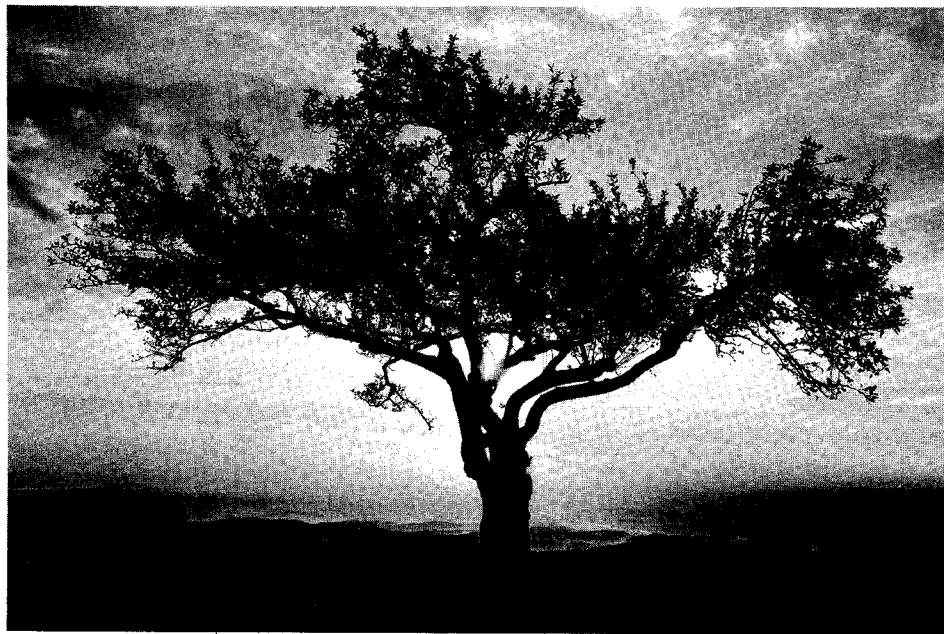
I am disappointed with your recent article on wood-heat innovations. Mankind has been gifted with the tree ... it needs no tax credits or bad press by people like you: vegetarians who wear leather shoes.

The letters we get are colorful, all right. The best part for me is the surprise: I'm never prepared for the wildly different underlying assumptions readers bring with them. All are welcome — politically active greens, as well as you right-leaning, steak-chomping organic chemists with Buicks.

In America, so far, *personal choices are private*. I think the emphasis on rigid demographic cliques is fracturing society and getting in the way of our common humanity and goals. The environment belongs to all: I want everybody to read GARBAGE.



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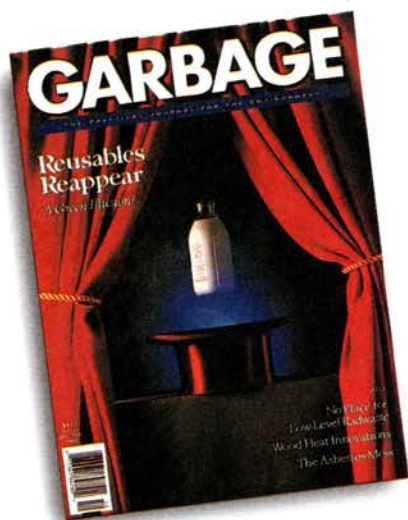
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The GARBAGE Gap

I AM ONE OF THOSE SUBSCRIBERS WHO, SINCE I'm happy with the magazine, never writes. However, after reading the virulent negative letters in the Dec/Jan issue, I feel compelled to give you some positive feedback: I'm very pleased with the scope of GARBAGE. The articles are well balanced and fair. If the articles are controversial and challenge readers' notions, that's good! Please don't change your focus or compromise your reporting style. I'd also like to comment on the layout and graphics — it's a great looking magazine. And kudos on the recycled paper.

When I read your magazine on the bus, I frequently catch people reading over my shoulder. People ask me, "What's that magazine?" I've handed out several of the tear-away subscription cards, so I hope your subscriptions have gone up a bit!

WENDY WARRINGTON
San Francisco

YOU CALL GARBAGE "THE PRACTICAL JOURNAL for the environment." However, it would be more appropriately called "the glib journal for appeasing the guilty conscience of conspicuous consumers."

Your magazine consistently deals with issues in a most shortsighted manner. It is apparent that you are aiming at a specific demographic group (suburban upper-middle class) that has no real desire to curb its consumption beyond the token gestures of recycling and composting. Here are a few hints:

Don't eat meat. Buy your clothing at thrift stores. Sell your car, and buy a bicycle. Ride mass transit. Avoid multinational

LETTERS

corporate products and services; patronize small local businesses. Go to the farmer's market instead of Safeway for your produce. Buy in bulk when possible. Find a job as close to home as possible. Have less children. Learn to sacrifice unnecessary luxuries. Question yourself. Be responsible.

[GARBAGE should] stop telling people what they want to hear.

SUSANNE HEWITT
San Francisco

LET ME APPLAUD YOU FOR TRYING TO BE rational in an area where so many people are being guided by their emotions. As far as the charges that you're more concerned with reaching yuppies than people who are "really concerned" about the environment: Getting a large number of yuppies to change their habits even slightly yields more hope for the future than preaching to the choir of environmental activists — a choir that often doesn't want to be told when there's a mistake in the score.

KEITH E GATLING
Syracuse, N.Y.

ONE THING THAT PARTICULARLY BUGS ME about many environmentalists is their inability to see that many people are simply unable to adopt certain ecologically sound procedures, for financial, logistic, and safety reasons.

I would suggest that before they go off bitching at everyone else for not wearing 100 percent organic cotton and not eating only organic and free-range food, and to stop using automobiles, air conditioning, and other energy-devouring devices, the radical fringe think about the fact that not everyone is capable of adopting the rigorous lifestyle they endorse. Those of us who are doing what we can care little for this sort of shrill condemnation.

As someone who cares deeply about the Earth, but who often feels put off by the rabid vociferousness of many hard-line environmental 'zines and groups, I say thanks, Patricia.

AMIE E. VONGVISITH
Tulsa, Okla.

Packaging Points

THANKS FOR HAVING THE COURAGE TO POINT out that many of the environmental emperors are often running around buck naked ("Packaging in the '90s" Dec/Jan). The environmental debate needs some balance and I can't think of a better magazine to promote that balance than GARBAGE.

This country's environmental problems are extremely complicated and will not be solved by using popcorn as a package cushioning material, biodegradable trash bags, or cloth diapers. Nor is it useful to portray efforts to find solutions to environmental problems as a clear fight of good against evil, environmentalist against industry.

The truth is that any *real* solution will involve both environmentalists *and* industry. Any real solution will be complicated, take a long time, and probably cost a lot of money. Anytime someone suggests otherwise, they divert attention from the hard work that must be done to find these real solutions.

Thanks for publishing one of the most balanced and comprehensive stories on packaging and the environment that I've seen in quite some time.

JOHN B. CUDAHY
Manager, Program Services
Institute of Packaging Professionals
Herndon, Va.

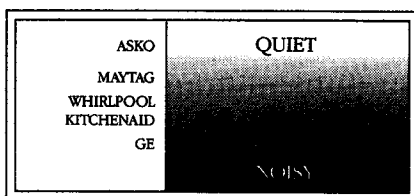
WHILE YOUR ARTICLE DOES SAY THAT THE Tellus study is "very controversial," uses "a relatively new approach that hasn't been widely tested," and that Tellus "has been criticized for using old data," the weight given the study appears to validate a questionable report. We think the Tellus study is seriously biased — for example, many important energy and environmental impacts were ignored, especially for plastics packaging. We would hate to think that readers would treat this flawed report as gospel because of the way it appeared in GARBAGE.

Next time you put together such an article, perhaps it would lend some balance if you consulted more with packaging manufacturers who could give you

NEXT TO ASKO, THE OTHER GUYS ARE LOUD, NOISY AND DRINK TOO MUCH.

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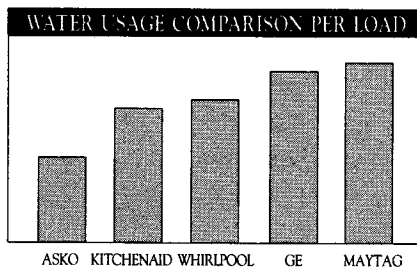
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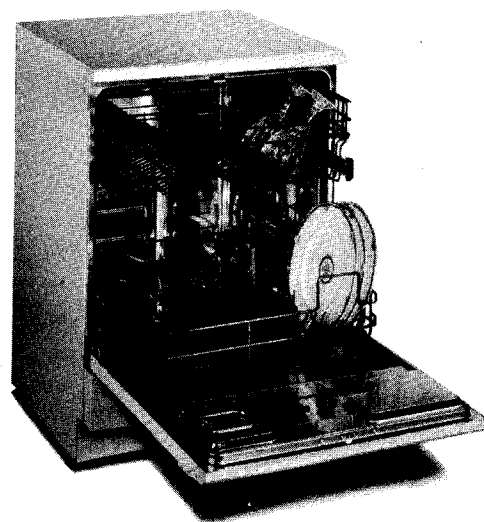
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NATALIE U. ROY
Dir., Recycling & Legislative Affairs
Glass Packaging Institute
Washington, D.C.

Packaging manufacturers were consulted. I'll put your name in my Rolodex. — P. Poore.

YOU QUOTE GEOFFREY LOMAX, FROM THE National Environmental Law Center saying, "You might not want refillables in South Dakota, that could be counterproductive in terms of energy and solid waste." While his point is well-taken, the inclusion of the quote is confusing. In the same issue, you have an article on "circle cities" in which Prof. Phil Lewis says that 85 percent of the U.S. population is in such urban/suburban areas. That statistic is probably not too far from reality. Therefore, the significance of refillables not working in South Dakota needs to be

qualified in relation to the concentration of U.S. population.

If I lived in San Francisco and thought I was doing something good by buying milk in glass containers, was I being misled? Does the notion "reduce, reuse, recycle" mean anything anymore?

Another undeveloped quote was in "Doing Their Low-Level Best", from MIT staffer Mitchell Galanek. I disagree whole-heartedly with him when he says, "We're not going to close down..." If the public decides that low-level waste cannot be handled effectively or safely, then it can and *must* shut dangerous research down. That quote smacks of arrogance and intractability, neither of which is responsible.

I am scientifically illiterate compared to Mr. Galanek (I hope, for MIT's sake), but as an average citizen who votes on these issues, I will not let Mr. Galanek get away with thinking that the low-level waste creators can operate without any *civilian* oversight.

With that off my chest, I thank you for publishing such an interesting maga-

zine, especially the great "In the Dumpster" column, the valuable "GARBAGE Index," and the "Keepers" section, which is not only good for the items featured, but the ideas generated from them.

TERRY MULLEN
San Francisco

PLASTIC IS MADE FROM OIL, AND THE WORLD'S supply of oil is running out. Therefore, it is obvious that plastic must be avoided whenever alternatives exist, unless you imagine that we'll all have electric cars [soon], and heat with solar energy.

Unless you can show us how we can have a workable, widespread alternative to oil sometime in the next couple decades, try to be more clear-headed about the use and reuse of plastic.

CARLYNN RICKS
San Antonio, Texas

MILK IN GLASS BOTTLES IS MORE COSTLY, BUT it is ridiculous to add in the cost of the deposit to the cost of the milk. The deposit is hardly a cost — you get it back, that's why it's called a deposit. Anyway, I buy

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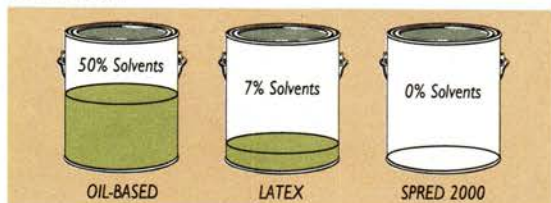


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milk in a glass bottle not because of the "image" of the bottle, but because it is the best tasting and freshest milk I can get in my area.

TERRY MEYERS-GULOTTY
Brooklyn, N.Y.

They Shoot Deer?

IN "DEFLOWERING SUBURBIA" (DEC/JAN 1993), it is fortunate that writer Bill Breen did not sanction the idea of shooting deer to reduce their densities in the Northeast and Midwest. Instead, [the article reported] the use of humane technology, such as immunocontraception, which will limit deer reproduction. Mr. Breen did, however, exaggerate the impact that deer have on forests.

Deer browsing, in almost every circumstance, reduces biomass, not biodiversity. Deer browsing on fast-growing eastern forest species sometimes creates a browse line, but more often than not produces little visible impact. While some people may perceive a browse line or limited sapling regeneration as an aesthetic problem, it is hardly an ecological problem.

It is, in fact, probably what occurred 200 years ago, before people wiped out deer.

Ultimately, the question is not one of biological carrying capacity (the number of animals that an ecosystem can sustain). Rather, it is a question of cultural carrying capacity, the number of animals people can tolerate. Unfortunately, too many people think the browsing of a rhododendron or some ornamental shrubbery is a capital crime. Fundamentally, humans need to learn to share the planet, not to control and dominate it.

WAYNE PACELLE
National Director
The Fund For Animals
Silver Spring, Md.

WHY PUMP MILLIONS OF DOLLARS DOWN THE drain trying to give deer the "pill," or hire people to kill them? Hunting is how "Mother Nature" intended deer populations to be controlled. Let's stick with a proven, natural method: regulated sport hunting.

GARY L. LARSON
Decatur, Ill.

[BILL BREEN] SHOWED A CERTAIN CITIFIED ignorance about hunting. The solution to deer overpopulation? Birth control! Now, that's a good, natural way to handle it. One can imagine an army of civil servants stalking through the woods with dart guns. Why not hunting vets, dispensing vasectomies? It's too absurd to imagine.

The only solution that makes sense is to increase hunting, both by human and non-human predators. Near suburban areas, bow hunting could be emphasized since it is such a short-range weapon. In any case, the solution has not been advanced by printing articles like this, which seek to smear hunters.

PAUL BONNEAU
Portland, Ore.

Thanks for writing. I reported on the damage inflicted by deer grazing on wild, endangered plant species — not suburban shrubbery; and I reported that immunocontraception is in the early stages of research. Though some think deer (over)population should be controlled through contraceptives, I'm not one of them.
—Bill Breen



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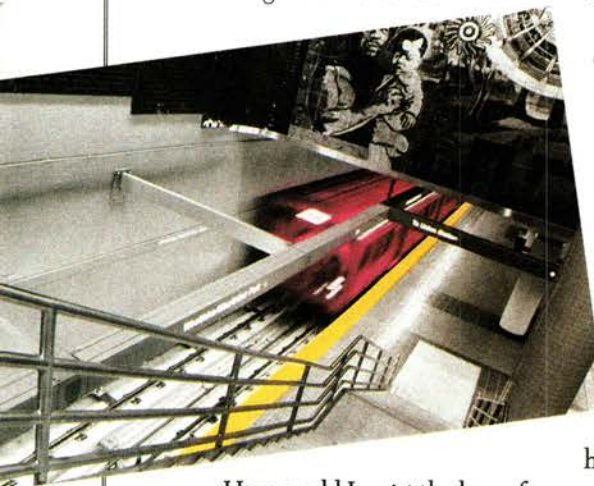
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Lifting the Lid

AUTO ALTERNATIVES

L.A. Tries the Subway

ONE OF MY FONDEST CHILDHOOD MEMORIES is of riding home to Brooklyn late at night on the subway. Lulled by the clickety clack of wheels on rails, I'd drift in and out of sleep on my mother's shoulder while we made the long journey back from Manhattan. Despite its problems, the subway was always the fastest and cheapest way for a New Yorker to get around town.



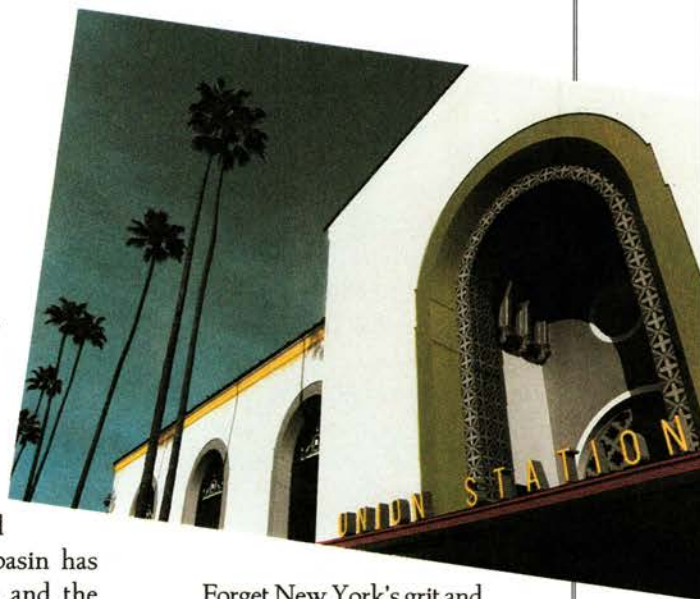
How could I resist the lure of a new subway, launched in Los Angeles — the car culture's epicenter?

Compared with the Big Apple's gargantuan system, which rolls over 250 miles of track, L.A.'s Metro Red Line is but a toddler. So far, just the first segment — 4.4 miles, five stations — is up and running. But it's a crucial part of a grander plan to wean Angelenos off their vehicles.

Ironically, Los Angeles once had one of the finest rapid transit systems in the world. The Pacific Electric Railway was a large, efficient network that went all over L.A. The freeway ended all that. Now the L.A. basin has humongous traffic snarls and the nation's worst smog.

So Los Angeles County decided to create an ambitious, county-wide transportation network called the Metro System. It will take in 300 miles of rail (subway and surface rail lines), plus bus services, freeway lanes for car pools, bikeways, and park-and-ride sites. The new subway is intended to be the system's underground backbone.

I caught a subway train at Union Station. Slated to become a major transportation hub, this historic Amtrak station will connect with multiple bus lines and commuter-rail lines serving five counties. Seven minutes later I had whooshed across downtown Los Angeles, beneath presumably congested roads, to MacArthur Park. Along the way I could have transferred to the 22-mile Metro Blue Line to Long Beach, which opened in 1990. In 1994 I'll be able to take the subway all the way to LAX airport.



Forget New York's grit and grime. L.A.'s stations are graced with commissioned art, stainless-steel railings, cavernous ceilings, and more than adequate lighting. Sheriffs' deputies patrol a system that's designed to eliminate dark corners and hiding places. There's even a no fuss semi-honor system for collecting fares.

The Red Line was full of passengers on both a Saturday afternoon and on midday during the week. The people I chatted with were enthusiastic. But is L.A. on the right track?

The project already has its share of doomsayers: It's too [Cont. on p.16]



[Cont. from p.15] expensive; you'll never get enough Angelenos to give up the car. Then there's the pricetag: The transportation overhaul comes to a hefty \$183 billion over the next 30 years — of which \$5.3 billion goes toward the 22.7 miles of subway to be completed by 2001. That makes it the largest public-works program in the U.S.

I wondered, will enough Angelenos be won over to justify this outlay? Alvin Spivak, past president of the Modern Transit Society, a nonprofit group in San Jose, responds with his own question: "How do you measure success in a transit operation?"

Is it in dollar savings? Cleaner air and faster, more pleasant commutes? Experts have come up with some astounding figures: A subway can carry 40,000 people per "lane" (track) per hour, while a highway handles just 2,000 people per hour. Here's another: By 2010, the Metro System would reduce tailpipe emissions of hydrocarbons, nitrogen oxides, and carbon monoxide by 51 tons per day.

Subway supporters further point out that carpooling is no match for L.A.'s heavily traveled corridors. Life in the fast lane? Hah! On L.A.'s freeways during peak hours, drivers putter along at about 29 mph — a figure that's projected to drop to 17 mph by the year 2010. Into the mix we also throw the reduction-in-frustration theme. Drivers avoid stop-and-go stress. Employers put the brakes on lost productivity.

Can it be that filthy air and clogged highways have finally forced Los Angeles to take the high road to becoming a truly civilized city? Meet me at Union Station in 2001, and we'll find out.

— Nancy Bruning

NANCY BRUNING IS A SAN FRANCISCO-BASED WRITER AND THE AUTHOR OF *CITIES AGAINST NATURE*. SHE DOES NOT DRIVE A CAR.

This Just In...

Is Burning Recycling? Does burning pelletized paper for fuel count as recycling? Georgia-Pacific launched a PR campaign claiming that it does.

The huge papermaker recently joined Ashley County, Arkansas, in a project to pelletize "unmarketable" low-grade paper collected at curbside, and burn it as supplemental boiler fuel at its paper mill in Crossett, Arkansas. The town expects to send 25 tons of pelletized paper a day to the mill. Because the program keeps paper out of landfills and energy is recovered, the burning was billed as part of the county's recycling program.

"We caught a lot of flak on that," admits David Modi of GP. "We did not mean to imply that burning pellets is of equal value to recycling."

Georgia-Pacific identifies a persistent problem with paper recycling: supply of old, low-grade paper outstrips demand. The company rightly points out that burning the paper for energy as a fuel supplement to coal is better than dumping it.

"But a lot of people told us loud and clear that it's not recycling," says Mr. Modi. "And now we are saying, 'Yeah, you're right.'"



Cars to Cash On some American back roads, abandoned cars are as familiar as billboards. Not in Kentucky. Over the last 20 years, community groups working with the state have exhumed 41,000 dead cars from their final rusting places and sold them to scrap dealers, raising over \$850,000.

Volunteers cruise rural roads looking for cars. Most groups tally \$20-25 per vehicle. In addition to aiding community groups, cleaning up the landscape, and recycling scrap metal, the program creates jobs for local drivers. "It's like one of those TV giveaways," says Enlow Cammack, environmental programs coordinator for the state. "There's not really any downside to it."



Ashes to Ashes Seven years ago a moonscape of black coal refuse was all that remained of the American Electric Power (AEP) company's Sporn coal mine near New Haven, W. V. Now it's grassland dotted with shrubs and young trees. The secret ingredient? Coal ash.

AEP, required to revegetate the site under the Surface Mining Control and Reclamation Act, encountered this problem: Nothing can grow on acidic coal refuse. Trucking clean topsoil from nearby areas would mean disturbing virgin ground. Importing dirt from far away would be expensive. But the company had fly ash, tons of it, at its nearby Mountaineer power plant.

AEP spread 2,300 tons of ash over the 23-acre refuse site. They added tons of agricultural fertilizer, straw and hay, lime, and a whole lot of seeds. The alkaline ash and lime neutralized the high acidity of the coal refuse, and the seeds took root. Says project engineer Ted Morrow: "Except for the sign we left up for posterity, it would pretty hard to tell there was ever a coal mine here."



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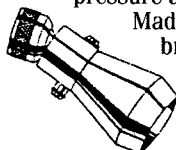


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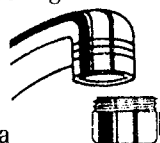
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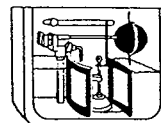
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The Garbage Index

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Time it takes for sunshine energy falling on the U.S. to equal fossil-fuel energy consumed by the U.S. in one year: **40 minutes**

Estimated area of photovoltaic solar energy cells needed to produce U.S. annual consumption of energy: **58,360 square miles**

Land area of Georgia: **58,060 square miles**

Cost of PV energy, 1960: **\$2,000 per watt in peak sunshine**

Cost in 1975: **\$70 per peak watt**

Cost in 1993: **\$5 per peak watt**

Energy-producing potential of PV panels sold in U.S., 1971: **0.1 megawatts**

(1 megawatt equals 1 million watts)

In 1991: **55.3 megawatts**

Sunniest city in the U.S.: **Yuma, Ariz.**

Percentage of possible sun Yuma gets: **90%**

Cloudiest city in the U.S.: **Quillayute, Wash.**

Average number of cloudy days there per year: **241**

State with the highest percentage of total energy accounted for by renewables: **Washington (54%)**

Explanation:

Washington's vast hydropower resources

State with lowest percentage of energy accounted for by renewables: **Kansas (0.3%)**

State with seven times more non-hydro renewable capacity than any other state: **California**

Exempting hydro, state with the highest percentage of total electricity production from renewables: **Maine**

Percentage of total energy consumed in U.S. that comes from renewables: **8.3%**

Percentage of renewable energy production that comes from biomass (wood, wood and agricultural wastes, landfill gas, ethanol, and MSW): **50%**

From hydro: **45%**

Geothermal, wind, and solar: **5%**

Number of average-size nuclear power plants (1,000 megawatts) equivalent to U.S. biomass, wind, and solar electric capacity: **12**

Percentage of existing biomass, wind, and solar electric capacity built since 1980: **90%**

Sources: Solar Energy Industries Association; Chris Greacen, Home Power Magazine; National Climatic Data Center; Public Citizen.



"Environmental Investing" (Sept/Oct '90)



The number of "socially responsible" mutual funds has doubled over the past year, according to *Business Ethics* magazine. But investment returns haven't always followed suit: In 1992, four environmental funds were among the ten worst-performing "sector" mutual funds (funds that invest in just one industry).

Environmental funds invest in everything from asbestos removal firms and alternative-energy startups to incinerator and waste-disposal companies. But just two funds — New Alternatives and the Schield Progressive Environmental fund — screen environmental records. Analysts note that sector funds are volatile, and things could turn around quickly.

For more information, check out a new publication called *The GreenMoney Journal*. It offers investment strategies, stock performance updates, and other resources. For a free trial issue, contact Cliff Feigenbaum, Publisher, *The GreenMoney Journal*, West 608 Glass Ave., Spokane, WA 99205; (509) 328-1741.



"Sludge" (Oct/Nov '92)

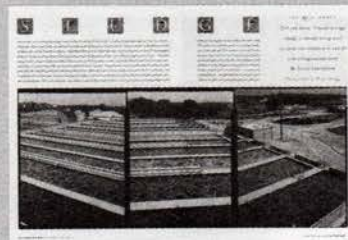


Fifteen years after they were first mandated by the Clean Water Act, rules setting allowable limits on pollutants in sewage sludge were finally published by the EPA in February.

Prior to the new rules, land application of sludge was regulated state by state. In theory, national rules should encourage more sludge recycling programs to go forward. But controversy surrounding the new regs, and the strict limits they impose on some contaminants, could have the opposite effect.

Sewage-treatment groups say it will be difficult to comply with new limits on the mineral molybdenum. And the leather industry is suing the EPA over the strict limits on chromium, an important element in the tanning process. On the other hand, the U.S. Department of Agriculture think the limits on cadmium from industrial wastes aren't strict enough.

Given the general grumbling, the EPA may revise the rules over the next few years, meaning more uncertainty for municipalities pondering whether to invest in sludge recycling programs.



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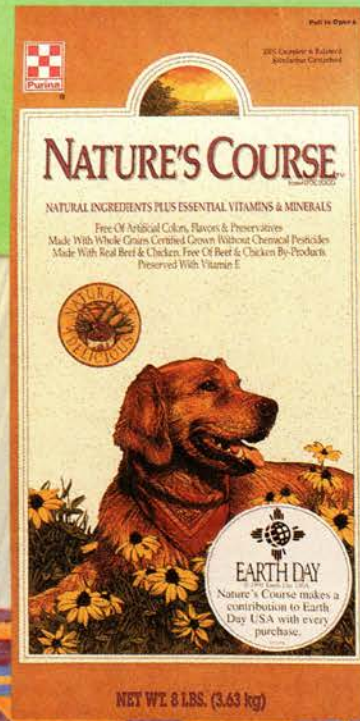
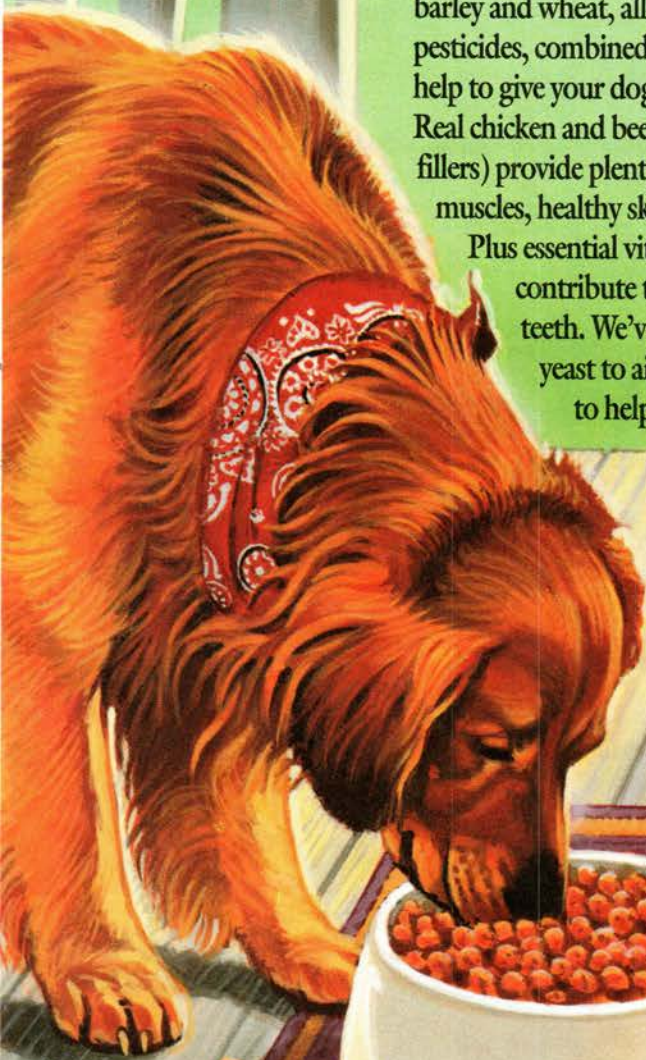
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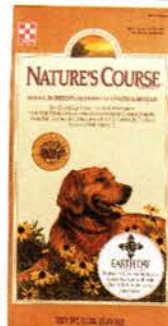


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COMPOSTING

How Do You Get Rid of a Dead Chicken?

GOT A BARN-FULL OF DEAD CHICKENS on your hands? Just how does one dispose of thousands of foul fowl, felled by disease or inevitable old age?

Well, here in Maine, the multi-million-bird DeCoster Egg Farm has led the nation in demonstrating how *not* to do it: Don't toss them out the back door and hope coyotes will ingest the evidence. When DeCoster dumped 100,000 dead hens in an open trench a few years ago, the stench, flies, and rats made activists of the quiet residents of Turner. Illegal burial grounds for more chickens threatened to contaminate the gravel aquifer beneath the farm.

DeCoster has since cleaned up its act. But thanks to the white-meat revolution, the nation's chicken population continues to rise. In six- to eight-week cycles, the nation now produces about 5.6 billion broilers a year. Broilers are mass-produced in houses that may hold

thousands of birds of the same age — many farms will have dozens of houses. Between birth defects, accident, disease, and rapid-growth disorders, five percent of those broilers never reach the table. A modest farm of 50,000 birds will produce 50 pounds of dead meat a day.

Enter master composter Dr. Dennis Murphy of the Cooperative Extension Service at the University of Maryland. Dr. Murphy has cooked up two sizes of composter that can turn a broiler to fertilizer in a matter of days. On a video that could be improved only with a voice-over from Julia Child, you can see him, along with farmers Kay and Sidney Richardson, working through the recipe.

Dr. Murphy's mini-composter can handle up to 25 pounds of "on-farm poultry mortality" a day. Layer straw and litter (manure) in a 3-foot-square bin, and add water. In a couple days, this will heat up to 140° or more. Now you can scoop out a pit and begin adding chickens, which will disintegrate in just a few days.

Two-stage composting, for big or particularly chicken-lethal farms, is a series of bins that are loaded with a tractor bucket. (The video offers some nice frames of chicken shovelling, which appears to require some skill.) Here, you layer your chickens four-feet deep with straw and litter. Hold the water. After a few days, when most

of the soft tissue has been converted to brown soil, scoop the whole pile into another box, introducing air that gives the microbes a fresh appetite to finish off the meal. Remove from oven and spread liberally — the Richardsons fertilize 500 acres of sweet corn with chicken compost.

There are other ways to get rid of a dead chicken, although Dr. Murphy is convinced composting is the best. Commonly, farmers incinerate the casualties. But this is slow, expensive, and odiferous. Burial is the oldest method, but groundwater contamination is putting a stop to that. Rendering (cooking whole carcasses for grease, pet food, etc.) is on the rise, but is hindered by the



unpleasant necessity of transporting dead and possibly infectious birds.

On the horizon are various methods of recycling chicken to chicken, by grinding up the dead and extruding them, with soybean or other grains, in the form of chicken feed. Also watch for adaptations of the composting recipe to handle fish, whole hogs, and calves, although these would require, of course, a different wine.

— Hannah Holmes

For the Record

"How would the French feel if Japan mounted a campaign to 'Save the Snails?'"

Japanese member of parliament Masao Kunihiro expressing Japanese resentment of international anti-whaling efforts.

(Boston Globe February 11, '93)

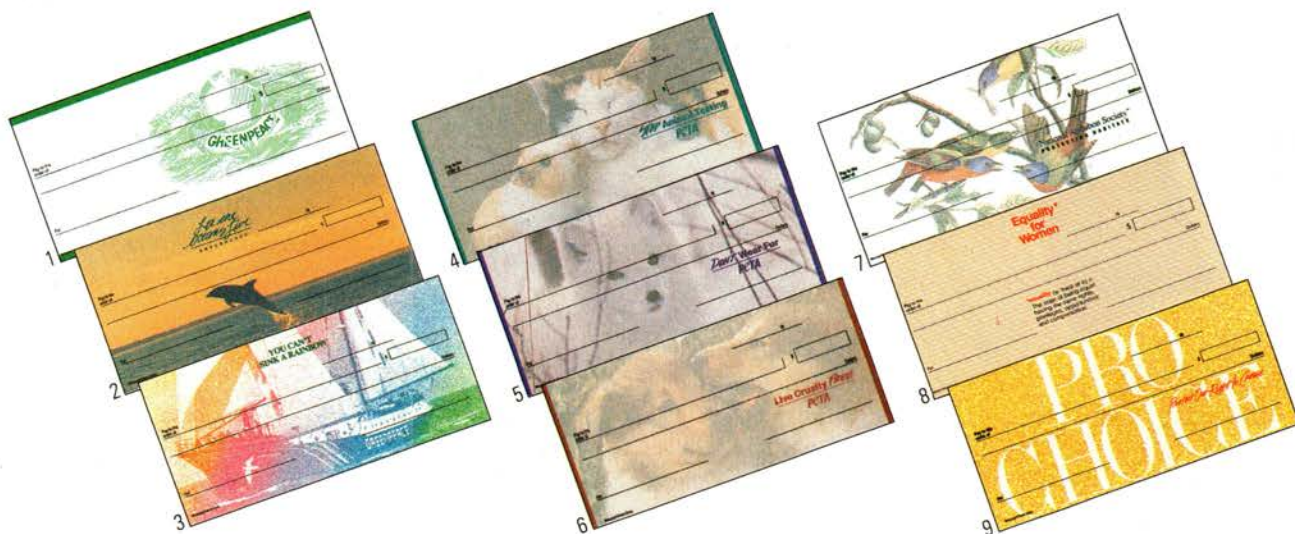
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Where Have All the Ragpickers Gone?

DURING MY CHILDHOOD IN THE EARLY '50S, I BECAME aware of a group of people called "ragpickers." I wasn't sure what they actually did, but I knew they worked in back alleys and garbage dumps. By adolescence, however, I had never seen one. Eventually, I relegated ragpickers to the same nether world as Santa's elves.

How could I have been so wrong! I am writing this confession of enlightenment to help document America's heritage of flesh-and-blood people who literally picked rags from garbage; and to open more eyes to the largest still-invisible component of today's refuse — used textiles. As an archaeologist, I am keenly aware that every society has scavengers who sort through refuse for reusable, recyclable, and other valuable items. Scavenging is now officially banned at most landfills in the U.S. due to safety and legal concerns, but it wasn't always that way. During the nineteenth and early twentieth centuries, ragpickers swarmed over our country's open dumps.

Although rag picking was considered work for the lowest classes, it was also relatively lucrative. The pickers' chief quarry was a category of rags called "thirds-and-blues." (Firsts were new, seconds were used, thirds were rags; the usable ones were all blue or light in color, i.e., no blacks or reds.) There were two thriving markets for thirds-and-blues: 1) The paper mills of the northeastern U.S., which provided one of the world's prime supplies of paper in those days. Cotton rags from nearby urban dumps provided the required fiber. 2) Mills in Yorkshire, England, and the northeastern U.S. that manufactured clothes called "shoddy" from cleaned, garnetted, respun, and rewoven wool rags. Because of the

strength and stability of both markets, turn-of-the-century ragpickers in the New York City area could sell a ton of picked rags for about \$350 in 1990 dollars. Not bad.

Soon, however, a one-two punch knocked out both rags and ragpickers. First, new technologies and rail links to the northwestern U.S. delivered clean, low-cost wood fibers for making paper. Second, the virgin textile industry lobbied successfully for the Wool Products Labeling Act of 1939, requiring shoddy textiles to be

labeled as "reprocessed" or "reused" wool.

At first, "shoddy" was a non-judgmental term. By 1862, however, a connotation of inferiority had been affixed to it, not because of poor quality or workmanship, but because shoddy cloth just wasn't "new." The devastating impact of shoddy clothes having to bear on their labels the epithets "reprocessed" or "reused" is evident by the fact that today in the U.S. the shoddy textile market is not even a memory; "shoddy" itself is now just an adjective meaning "inferior workmanship."

Where have all the ragpickers gone? No one really knows. It's probably more than just coincidence, however, that many in today's scrap-metal industry proudly trace their roots to ancestral ragpickers.

Where did all the rags go? Many are still recovered for in-house reprocessing and reuse by the textile trade. Many of the



new cuttings, or plant scraps, become "molded rag shoddy" for acoustical padding, or "headliner" for roof padding in automobiles. In addition, according to the Council for Textile Recycling, a yearly haul of 1.25 million tons of post-consumer textile wastes are recovered from resale shops, charities, and the like. Some of that is recycled into new rags and felts for industrial wiping and polishing, and for home uses. (Bags of reprocessed rags, for example, are on sale at auto supply stores.) At least half a million of these tons are graded and, if found wearable, exported to markets in Third World countries. Unwearable clothes are mixed with asphalt to become new roof shingles.

Households, however, don't have such comprehensive recycling programs. As a result, still more textile wastes end up in landfills. Once there, they don't degrade any faster than does paper (i.e., not very fast at all). This brings us to the second phase of my enlightenment.


Overall, rags comprise about two

percent of household refuse by weight. Garbage Project sorts of fresh refuse have determined that used textiles flow primarily from low-income neighborhoods. This is because some upper-income (and even some middle-income) households consider clothing "old" or unwearable after just a few uses — sometimes after just one outing. Its owners know it's still functional, and often they will give away or sell their textiles. The recipients of these hand-me-downs become the major discarders of clothing (by now mostly in pieces). Compared to middle- and upper-income households, low-income households in Tucson and Phoenix on average send three times more textile seconds to local landfills.

When the Garbage Project started digging into landfills, we didn't pay much attention to the textile category in our results. When I finally decided to determine how many rags a ragpicker could pick, I was shocked by the answer: lots and lots! The Garbage Project has now excavated fifteen landfills in the U.S. and Canada.

Within these, textiles represent 5 to 6.5 percent of the volume of MSW landfilled over the last twenty years — far more than all expanded polystyrene, fast-food packaging, and disposable diapers combined.

Of course, rags which evade recovery by the textile industry aren't worth much today. But hold on: Madison Avenue and the clothing industry may be riding to the rescue. As part of its fall '93 "Ecollection," Esprit is marketing a duffle coat made of 100 percent "post-industrial undyed wool" (translation: plant scraps); and, more importantly, a Donegal tweed gardener's jacket made from reprocessed post-consumer sweaters. Shoddy may be making a comeback.

Who knows from what cloth Hillary's next gown will be cut? Somewhere, all those ragpickers are smiling. 

Archaeologist Dr. William L. Rathje is founder and director of the Garbage Project, and professor of anthropology at University of Arizona-Tucson.

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Dodging Tomatoes, Rice Growers Clean Up

FOR 30 YEARS, CALIFORNIA'S RICE GROWERS AND ENVIRONMENTAL groups have been at each other's throats. Author Marc Reisner's book *Cadillac Desert* scalded the rice industry for "growing a monsoon crop in the desert."

Farmers countered that environmentalists were trying to destroy their livelihood. Few could have imagined that the two sides would

become unlikely allies in a project that could restore a vast expanse of wetlands that nourishes millions of migratory waterfowl.

To begin at the beginning: In spring and summer of years past, farmers diverted billions of gallons of water from the Sacramento and Feather rivers into rice paddies, lacing the water with pesticides and herbicides. Every three or four days, the tainted drainage was dumped back into the Sacramento River and the cycle was repeated ... 'round the clock. Water supplies acquired a bitter taste. Aquatic organisms accumulated toxic levels of insecticides.

In fall and early winter, tons of leftover rice stubble (a.k.a. "waste straw") were torched to clear the fields for the following year's planting. Smoke from the burning fields blackened the skies over the Sacramento Valley. Thick with compounds that researchers found to be carcinogenic and mutagenic (causing birth defects), the smoke also contained microscopic slivers of insoluble, abrasive silica.

Campaigns by environmental groups and the American Lung Association prompted the California State Legislature to order that the burning be phased out by 1998. The public outcry also had this effect: Farmers began searching for alternative methods for getting rid of the waste straw.


Duck hunters and bird watchers pushed farmers to keep fields flooded in winter (when water is more abundant),

thereby creating new wetlands. And federal and state agencies subsidized water costs, paying growers to let marginal, hard-to-farm lands revert to natural wetlands.

As an alternative to burning, thirty growers flooded 12,000 acres. They hoped that waterborne bacteria, aided by birds eating and defecating on fields, would decompose the waste straw come spring. If it

works, the effort will grow to encompass at least 200,000 acres. Audubon officials believe that amount of land could support 10 to 15 million wintering birds, rather than the 3 million that currently stay over.

Free water storage is another bonus. Drawn from rivers in winter, water that would otherwise flow to the sea will be released in spring to irrigate fields in the San Joaquin Valley. Fish might flourish. Waterfowl could rebound after a 30-year decline. And rice growers? They might plow richer soil — and stay in business.

All without a dollar wasted on lawyers and courtrooms. 

Tom Harris is a veteran environmental reporter who lives in Rancho Cordova, California.





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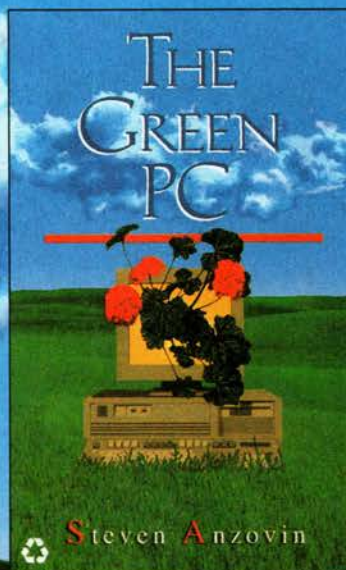
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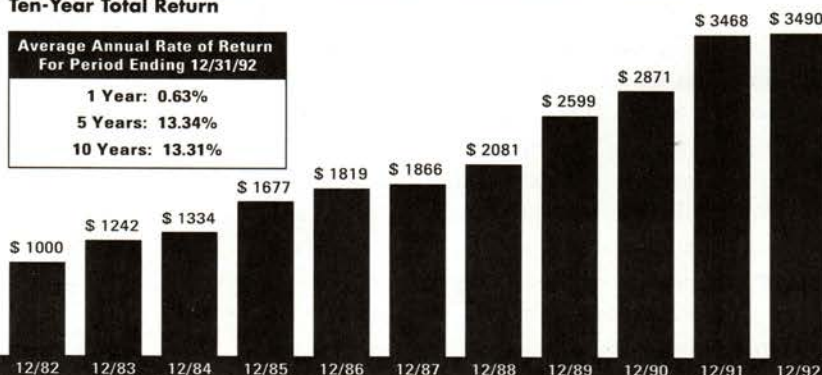
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Enviro Education

Is it Science, Civics — or Propaganda?

BY PATRICIA POORE

ENVIRONMENTAL EDUCATION IN SCHOOLS WAS INEVITABLE. IN AN AGE WHEN SOCIAL issues of all types find their way into the curriculum, environmentalism has become a mainstream political force — one with enough clout to push through legislated mandates. Even in states where this new curriculum is not yet law, parents, teachers, and environmental groups push for classes that address the environment. • A few topics get the lion's share of time, among them planting trees and assessing the biodegradability of various packaging materials. "Recycling's real big: In education today, the thing is action," says Dr. Marc Lane, currently chairman of the Governor's Advisory Council on Environ-

mental Education, operating from the Arizona Department of Environmental Quality. "I think it's good: You can't have awareness without action. Recycling is the glitz, a vehicle for teaching, because the kids like to go out and do something."

Other prominent educators, too, see no problem in crossing the line from science to social issues. Dr. Howard Sullivan, a professor at Arizona State University, has long assessed teaching materials in the fields of energy and economics. What constitutes environmental education today are the "hot" topics: air pollution, especially smog, acid rain, and global warming; water pollution; and recycling.

"Recycling [as a teaching unit] is terrific. Important societal issues, even causes, are more important than knowing the capital of Brazil."

APPARENTLY, ACCEPTANCE OF A NEW "ENVIRONMENTAL CURRICULUM" is nearly universal among parents, teachers, students, environmentalists, and even educators in academia. So let's leave aside the argument that environmental science has been taught all along, as "natural science," "earth and space science," "ecology," and in biology and chemistry classes. Where are the new course materials going to come from?

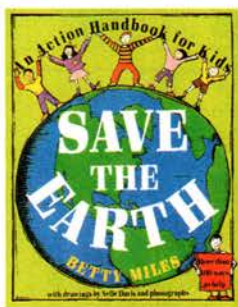
"Schools have no choice, so they take what they can get their hands on," offers Dr. Robert Melnick, a policy analyst specializing in the environment with the Morrison Institute at Arizona State University. "I have no stats, but, from my research, I would say that [educators and state legislators] made a leap of

ILLUSTRATION BY BETSY EVERITT





Books aimed at children too young to have a strong science background skip straight to activism.



A numbing display of depressing photos, and contents pages enumerating eco-disasters, are the "hip" alternatives to ecology basics.

faith that the market would respond to mandates."

Most state mandates say that each district must adopt environmental education and integrate it into the curriculum. No one has to develop a stand-alone course, necessarily, but rather use the environment as a vehicle to teach.

The "integrated" nature of environmental education may be one reason why traditional textbook publishers have not rushed to create course books. Instead, in the majority of school districts that have not been the recipients of educator-prepared curriculum materials, teachers so far rely on a patchwork of published materials, including magazines, trade paperbacks (published for the general bookstore market), and newsletters from conservation organizations. Videos, almost exclusively from nontraditional "educators" such as Disney and Turner Broadcasting, round out the curricular materials.

Trade Publishing: The Unofficial Curriculum

SOME EDUCATORS QUESTION WHETHER THE combination of commercial publishing and activism is the best way to develop a new curriculum. The truth is, excellent published materials exist which present environmental topics in clear, science-based, unpoliticized text that appeals to a child's curiosity and sense of wonder, rather than eliciting fear and a call to activism. But I had to look hard for them.¹

Perusing our library's collection of "environmental" books for children, sent to us for review and by definition those most heavily promoted by their publishers, I was struck by the repetitive topics, the emphasis on social problems rather than science background, and the call to activism.

Consumer books, including the ubiquitous *50 Simple Things Kids Can Do to Save the Earth*, are finding their way into the classroom in the absence of approved and educator-reviewed textbooks. "There are a lot of trade books — children's nonfiction — on environmental topics," says Trevelyn Jones, editor of *School Library Journal*. "They go into public libraries and school libraries, and kids use them to research and write reports. Yes, some of them do make their way into the classroom."

Perhaps most significant in these books is what's *not* included: Every chapter devoted to elephant extinction or garbage crowds out a rich array of important environmental basics. Perpetuation of outdated assumptions is rampant in what is included. Throughout the materials I reviewed,

the following assumptions were nearly universal: (1) Garbage is a major environmental problem, especially packaging, especially plastic packaging. Landfills leak and pollute water, incinerators spew toxic air pollution. Therefore, we have to stop buying things that are "over-packaged" and we have to recycle.

(2) There is a hole in the ozone; it is recent and man-made, it is getting worse, and it has to do with CFCs, which chemical companies knew were bad. Thinning ozone will result in increased UV at ground level, which will result in eye cataracts, immune deficiency, and skin cancer for us all. It is probable that UV will damage plankton, therefore interfering with the whole food chain and causing an irreparable catastrophe. Although it already may be too late, we might halt the progression if we stop using aerosols, foam packaging, and air conditioners, or if industry would pay for chemists to come up with a substitute for CFCs.

(3) Global warming is a fact, proven by the hot summers of the 1980s. Technology, cars, greed, and cutting down rain forests caused it. We can mitigate the effects (described in unabashed detail as "scientists' predictions") only through a cessation of industrial activity and population growth.

(4) Our food is less nutritious and more toxic than it used to be, because the oceans are polluted (and therefore fish are sometimes poisonous), we ingest pesticides sprayed on fruits and vegetables, and meat is full of chemicals, antibiotics, and hormones that cause cancer and other harm to humans.

(5) If we were all vegetarians, we could feed everyone on earth. It is Western insistence on meat and Western overeating which cause famine elsewhere.

(6) Acid rain is a new phenomenon, and a major cause of manmade pollution. It kills whole forests and makes rivers and lakes too acidic to support life. It is caused by our reliance on electricity, which is created by burning coal. Lessons imply, to children as young as six, that the rain falling outside is dangerous, and that they can help solve the problem by turning off lights.

It's no surprise that the list above echoes common public misconceptions, many of which have been questioned and updated. The release of printed educational material lags behind the evolution of environmental thought. Also, the need for simplicity in writing for young children exacerbates the black-or-white tendencies of environmental rhetoric.

IN MY OPINION, THE PIECEMEAL CURRICULUM, AT LEAST in this initial rush, contains oversimplification and myth, has little historical perspective, is political-



(Left) Indoctrinated schoolchildren presents a public-relations nightmare. Where will their nightmares go when the inevitable incinerator is built?

ly oriented, and is strongly weighted toward a traditional environmentalist viewpoint, i.e., emphasizing limits to growth, distrust of technology, misinformation concerning waste management, and gloomy (if not doomsday) scenarios.

I am hardly the first to voice these concerns, although I may be the first environmentalist to do so in a magazine article. Dr. Herbert London, then a fellow at the prestigious Hudson Institute, wrote a whole book, published in 1984, after his daughters came home suffering from fears about the end of the world. Entitled *Why Are They Lying to Our Children?*, the book² is a heated expose of what Dr. London refers to as lies, gleaned from his study of dozens of social-studies textbooks published in the early 1980s.

Dr. London's book covered several social topics, all of which have been co-opted by popular "environmentalism." Predictably, in a recent interview, he felt things have gotten much worse since the mid 1980s, with the escalation in interest about the environment. "The materials in environmental education have nothing to do with environmental science... they are wholly political. The effects [of politicized environmental education materials] are pernicious: It is no longer possible to have a

sensible discussion. You cannot talk about historical perspective or risk/benefit or tradeoffs. You have to follow the utopian path.³"

Although the worst examples of scholarship show up in the trade paperbacks, Dr. London's criticism is aimed at the underlying assumptions in educator-reviewed textbooks.

"The problem with textbook preparation, of course, is that so many interest groups have to be appeased to gain statewide adoption. Environmentalists are a formidable political force, and they monitor textbooks. So some books have striven for 'balance' by giving both sides. Often, that's adequate.

"But there's a classic problem with 'giving both sides,' in some instances. If you had to develop a position between 'the earth is flat' and 'the earth is round,' the discussion would be patently ridiculous."

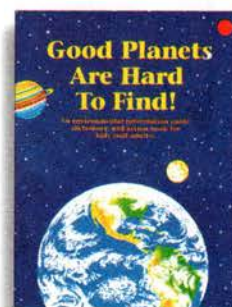
Critics of the current curricula are not suggesting that recycling is an unworthy topic, or a useless exercise for children to practice. No one has suggested that population growth and food shortages present no dilemma. But I will suggest that repetitive topic areas, presented from a single point of view, create a curriculum that is incomplete at best, and misleading and unnecessarily pessimistic at worst. Which brings us to the next section.

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Apocalypse & Advocacy

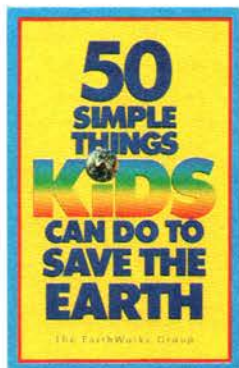
HALF-TRUTHS AND POLITICS ARE NOTHING new in education, one could argue — although pitfalls are magnified in the environmental arena, well known for its emotional content, political correctness, and call to activism. What is even more striking than the imperfect content of the curriculum, however, is its apocalyptic tone.

Words like menace, catastrophe, collapse, shortage, disaster, breakdown, alarm, degradation, and



On the back cover:
"Deforestation, desertification, erosion, famine, smog, acid rain, destruction of natural habitats, contamination of underground and surface waters, extinction of species, acidification of lakes, depletion of the ozone layer, destruction of coral reefs, and logging of the rain forest... Environmental destruction is our legacy. Time is short. Our situation is critical, and our options are simple. ...We must learn to use less and to recycle more...."

¹R.R. Bowker publishes an annotated bibliography of children's books with environmental themes, entitled *e for Environment*, by Patti Sinclair. It is thorough, occasionally critical, and does an excellent job of organizing books by topic area, from nature loving to activism. The hardbound bibliography's 517 titles include fiction, nonfiction, and a handful of titles for adults who work with children; the ages targeted are preschool through age 14. Contact Bowker Customer Service, PO Box 31, New Providence, NJ 07974; (800) 521-8110. Postpaid price, \$44.70. ²*Why Are They Lying to Our Children?*, by Herbert I. London, Stein and Day, 1984. ³Herbert London followed his treatise on "the problem" with a solution: He wrote *Visions of the Future*, a teacher guidebook and social-studies textbook. Published in 1986, it gives perspective on the past, he says, and does not dwell on pessimistic future scenarios. It has been adopted statewide in North Carolina, Indiana, and Arizona, and is used in other locales around the country.



A million-selling trade paperback with merit as light reading and an introduction to political environmentalism. But do simplistic pseudo-science and an unchallenged call to kid activism belong in the classroom?

deadly are ubiquitous. And unlike the singular apocalyptic vision of baby boomers' school days — nuclear annihilation — the sheer number of possible catastrophes terrorizes today's students with a host of disaster-bringing bogeymen: If acid rain doesn't get us, global warming will. Well-meaning people tell me they hope this urgency will propel kids toward positive action. But what if all the doomsaying elicits numbness or, worse, a sense that the future doesn't exist?

"When the FDA put out their call for public comment on bioengineered produce," recounts environmental policy analyst Jonathan Adler, "among the respondents were classrooms full of schoolchildren. Their letters didn't address the scientific or even, really, the ethical issues; they were about death! They called the biotech tomato 'FrankenTomato,' and they pleaded, 'Please don't do this, I don't want to die!'"

"The letters were written all at once and they were similar," continues Dr. Adler. "I'd call that brainwashing."

Professor Joseph Adelson, a psychologist at the University of Michigan, years ago conducted studies on the effects of nuclear apocalyptic scenarios on children growing up on them. "I'm almost certain that no one is working on the issue [of the longterm effects of apocalyptic environmental visions on schoolchildren]." Does he plan any such research? "No, it would be a waste of time. The emphasis [on crisis] should be stopped, on the basis

of common sense — you don't need a study."

Dr. Adelson is less concerned about the psychology than he is about the quality of education in general. "Politicization goes on in all areas. When it adds up [in the curriculum], it intrudes on the educational process," he states. "The environment is one of dozens of topics today that crowd out real education. You name it, there's a program for it. And in environmental education, as in other [politicized] areas, they teach clichés."

Items describing eco-freaked kids have turned up everywhere, from the *New York Times* to the garbage industry trade journal *Waste Age*, where a recent editorial by the CEO of the National Solid Wastes Management Association describes a letter from a young boy in California. Under the line "Please send information on recycling," the youngster drew a dark cloud shooting six bolts of lightning that hit a tombstone bearing the words "R.I.P. Earth, 0000 B.C. - 2000 A.D. Died of People." Above the cloud, large, squiggly letters warned, "Recycle or Else."

Further down the page, a blue and green heart-shaped planet Earth was ripped jaggedly in half, then shown to be demolished in a fiery explosion.

Mr. Wingerter didn't berate educators, but humbly shouldered the blame. "We in the industry must redouble our efforts to educate the public about waste. . . . public opinion surveys show that many adults seem as uninformed about waste management issues as that letter writer."

It's Getting Better...

While my search for balance in children's nonfiction went largely unrewarded, excellent curriculum materials, prepared by educators, are recently out or in the works. Among them:

"**The Earth Generation**" educator's guide is an environmental education program for middle- and junior high-school science students; available so far in New York, Michigan, and (soon) Arizona. Regional curricula are prepared by professional educators and the U.S. EPA with the cooperation, in each region, of a corporate partner and an environmental partner. (In N.Y., the partners were Niagara Mohawk Power and the N.Y. Audubon Society; in Michigan, Audubon and Dow Chemical.) The materials are well balanced and refreshingly free of cliché and blame. Activities stress scientific method rather than activism. Teacher guidebooks suggest specific ways to incorporate lessons and activities into the existing regional curriculum. Contact Earth Generation, PO Box 2005, Midland, Michigan, 48641. (517) 631-4010.

Education Development Specialists sells seven units for grades K through 6 (one unit per grade). Every unit covers air, land, water, and energy, but the different units have different focuses. (Conservation of natural resources and air pollution are two examples.) The package is for teachers. It includes a teacher's guide, hand-out masters, posters, practice exercises, homework, tests, etc. Sometimes schools buy them, but most business is through sponsors (such as the local sanitation district), who then give the curriculum to the schools. Individual units cost \$40 plus shipping. Order the four units for K-3 for \$120 total, plus shipping. Grades 4-6 costs \$95 total, plus shipping. Contact Ann Craftston, Education Development Specialists, 5505 E. Carson St., Suite 250, Lakewood, CA 90713. (310) 420-6814.

The Alliance for Environmental Education is the largest advocate for environmental education in North America, representing more than 50 million members through its 275 affiliate

organizations representing business, labor, government agencies and other nonprofit organizations. The Alliance has a network of 150 regional centers that develop curricula and conduct teacher training workshops. PO Box 368, The Plains, VA 22171; (703) 253-5812.

The Educational Resource Information Clearinghouse is funded by the U.S. Dept. of Education. ERIC maintains a massive database and library of materials related to science and environmental education, which it abstracts in various publications available to the public. The ERIC staff also produces its own materials. ERIC Clearinghouse for Education, 1200 Chambers Road, Room 310, Columbus, OH 43212; (614) 292-6717.

The EPA List: "Environmental Education Materials for Teachers and Young People (Grades K-12)" is outdated but a starting point for sources. This free 1991 listing of private and public organizations providing educational materials includes brief descriptions, plus addresses and contact names. U.S. EPA, Information Access Branch, Public Information Center, 401 M St., SW, PM-211B, Washington, DC 20460. (202) 260-2080.

Well, of course. The boy from California got his information from adults. Mr. Wingerter granted that the boy's letter was "extreme"; I could tell him it's not unusual.

Raising Little Activists

IF APOCALYPTIC EDUCATION DOESN'T CAUSE DEPRESSION or a live-for-now-because-there-is-no-tomorrow mentality, it can at least be implicated in a "parental nightmare" — the emergence of what one inflammatory writer called "little green Nazis."

"Star-Kist went dolphin-safe, McDonalds trashed plastic, Burger King abandoned rainforest beef, and both fast-food giants switched to recycled paper bags, in part because they could no longer handle the public-relations cost of eight-year-old activists deluging corporate offices with postcard hate mail," explains Mike Weilbacher, host of an environmental radio show in Philadelphia, and a conservation educator. "Surely, this is good news," you say? Dig deeper. There's a trend exemplified by the million-seller *50 Simple Things Kids Can Do to Save the Earth*. Among the simple things: 'Ask your parents not to buy products made of rainforest wood.' 'Talk to your parents about getting rechargeable batteries.' 'Ask your principal to buy only recycled paper.' Much of the book isn't really things to do, but things to tell others *not* to do."

Mike Weilbacher is a proponent of environmental education in schools, and wrote of its merits in a recent article in *E* magazine. Still, he declares, "Activists simply don't make good educators, no matter what the cause, for the agenda of an activist is to promulgate propaganda. Period."

"After an Earth Day 1990 kids' concert in New Jersey, whole busloads of schoolchildren were exhorted to 'go home and tell your parents to save the Earth.' Many activists see children as tools, or weapons in the environmental war to reach adult decision-makers. Want to hear something simple? That is obscene," the mild-mannered Weilbacher fumes.

"It must never be our goal to frighten kids into taking pre-determined actions," Mike Weilbacher continued. "[Yet] many environmental education programs attempt to take the express route from awareness to action, promoting teacher-led litter drives or dictated letters to the President. Rare are the occasions when students actually decide, plan, and implement the action step themselves."

America the Gluttonous

THE EMPHASIS IN ENVIRONMENTAL EDUCATION is on human-created problems of crisis proportion. Those problems are almost always presented as recent disasters created by the produc-

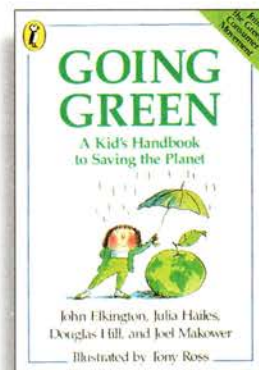
tivity of Westerners, especially Americans. Again and again, schoolchildren are admonished that the U.S. has 6% of the world's population, but "uses up" 40% of its resources. Not once, in all the materials I scanned, was it ever mentioned that the U.S. also produces 35% of the world's wealth, which finds its way around the globe. Nor was the question raised, what would the world be like if the U.S. used only 6% of the world's resources?

Children are told that farmland in the U.S. is being lost to housing developments and highways. Never are they told that in 1900, more than 50% of the U.S. population was engaged in farming and that today it is approximately 3 percent, yet output has increased to the point where food is one of our major exports.

The authors of environmental kids' books tell them that Americans have a duty to clean up our act and "save the planet." But they imply that it is an atonement for our sins, not an opportunity and noble obligation. Children are not told that an important reason environmental activism is so prevalent in the U.S. is *because* we have achieved a level of affluence that allows a society to focus on abstract issues, such as the future and quality of life.

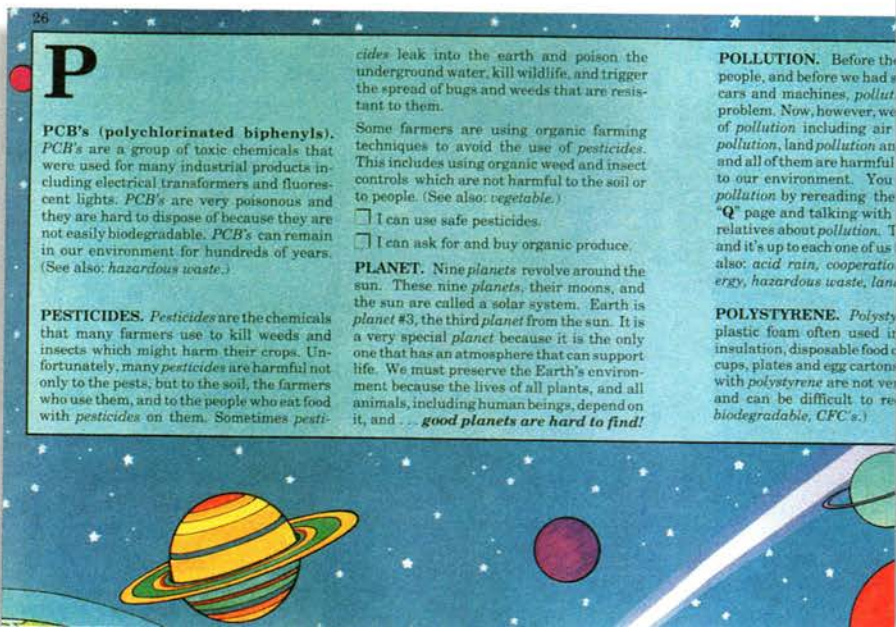
What possible good could come from the numbing repetition of self-defeating, pessimistic messages? I don't advocate a zealously patriotic, love-it-or-leave-it gloss on environmental lessons. But I do question the long-term effectiveness of guilt and fear as motivators. Good effort and results come from children (and a citizenship) who have a healthy understanding of their strengths, pride in past successes, and some sense that the future may be an improvement over the past.

Concludes Jonathan Adler: "If educators approach environmental issues in a balanced fashion, our children won't turn out politically correct. But at least they'll be much more 'eco-smart'." 🗑️



"Join the Green Consumer Movement," urges the teaser on the cover of this kid activists' handbook.

'P' is for PCBs, Pesticides, Pollution, & Polystyrene in this "environmental dictionary." Hey kids — ever hear of Photosynthesis?



By Hannah Holmes

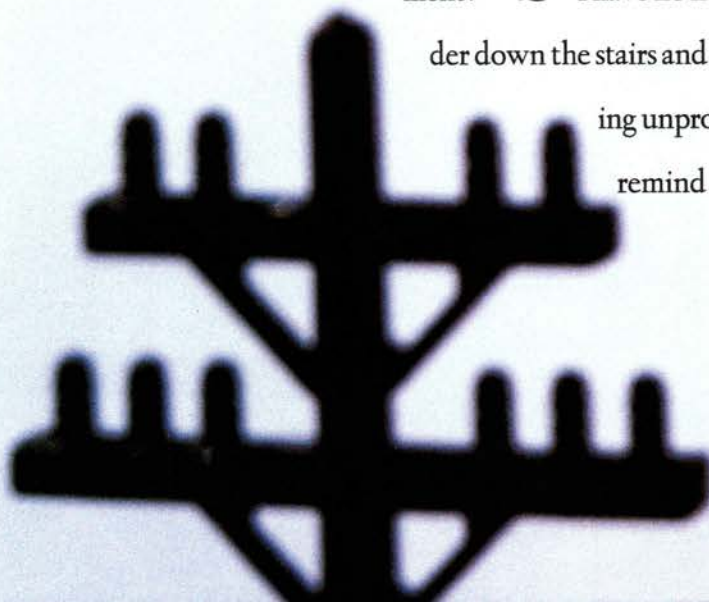


Telecommuting

**Yes, it saves gasoline,
air pollution, driving time, and
stress — wait — does it
save stress?**

IT'S 2:00 PM AND I'M SITTING AT MY DESK IN SWEATS AND A DOG-HAIRY SWEATER. My slippered feet rest on a stack of books. Over the phone, I'm conducting an important interview — the slippers don't show at all in my voice. As my source talks, I take notes, the phone propped against my shoulder. I ask him a question, and as he starts to answer, my dog Typo sits up and says, "woof!" He goes to the top of the stairs, spots a serial-killer at the door, and says, "bowowowowow!" 📞 There is a moment of silence on the other end of the phone, and finally, "That sounds like a big dog." 📞 "Heh, heh," I say, stretching to line up a clear shot with my plastic coffee mug. "Could I put you on hold, just for one moment?" 📞 I have no hold button, so my esteemed source hears me thunder down the stairs and battle Typo for access to the UPS man. I am panting unprofessionally when I return to the phone. "Now — remind me where this conversation was headed?"

P H O T O G R A P H Y B Y

**Christopher
Harting**



FOR THE LAST TWO YEARS, I'VE BEEN A LONG-distance employee of GARBAGE, hooked up by telephone wires to an office that's 80 miles away. My daily commute amounts to 19 steps, 11 of them being stairs. "Oh, that must be so great!" coo envious colleagues, corralled in office buildings in Manhattan or Chicago. "Do



you go to work in your pajamas?" While sleeping apparel is the first association many of the office-bound make with telecommuting, there do exist reasons to telecommute that are completely unrelated to either neckties or nylons.

The American commuter drives almost 4,000 miles to work and back each year, burning 190 gallons of gas, according to a survey by the U.S. Department of Transportation. The American commute rings up some severe environmental consequences each year:

- 11 million tires worn out.
- 23 billion gallons of gasoline burned.
- 219 million tons of greenhouse-gas CO₂ emitted.*
- 1 million tons of acid-rain precursors, nitrogen oxides.*
- 1.4 million tons of non-methane hydrocarbons, including carcinogenic benzene.*
- Smog, smog, smog. Smog is brewed when sunlight cooks auto emissions. It stunts plant growth, and causes breathing problems for animals, humans included.

*At 20 mph, and air temps of 50°F. Emissions increase with cold and extreme heat, and with engine speed.

But hang on — pollution and pajamas aren't the end of it. Jack Nilles, a Los Angeles-based consultant and father of the telecommuting concept, says people get 5 to 19 percent more work done when they stay home. This is reported by managers, who are most likely to resist letting employees out of sight, and least likely to overstate the benefits. And, because when one employee telecommutes everyone else

must be more thoughtful and organized, overall productivity may also rise.

"Could I put you on hold, just for one moment?"

—HANNAH HOLMES
The Author

And there's time. Many telecommuters need to replicate the 9 to 5 day at home. But those who

need only to accomplish a set task can choose their most productive hours, freeing up other time. Telecommuters also save the time they'd normally spend preening for the office, and driving time. Many also report that, out of necessity, they learn to compartmentalize their time better than they ever did in the office, so that work and home don't overlap. Overtime is much less traumatic at home, and sick days are fewer — for my part, I occasionally wake up feeling just lousy enough that I don't want to leave the house, but good enough to put in a day of what one telecommuter calls "brainless tasks." For the telecommuter, all this adds up to a feeling of control and efficiency — two important ingredients for good work.

And don't underestimate the value of a healthy, home-cooked lunch. This is how my mid-day break often fits into my routine: I light a low flame under a grilled cheese sandwich. I lean on the sink and watch sparrows squabble over the bird feeder in the backyard. The "home phone" rings, and I chat with a friend. The "work phone" rings. I slam down the home phone, and leap up the stairs. It's Mr. Big and Important from the Federal Hyperbole Agency — a crucial call I've been waiting for. He enlightens me and enlightens me and enlightens me until the smoke alarm goes off: Lunch is ready.

If this sounds like the lifestyle you want to enjoy, consider joining the 3 to 6 million people who already telecommute at least one day a week, people who work for Apple, IBM, Pacific Bell, Sears, Travelers, and countless other businesses, and for numerous state and federal governmental departments. The high cost of office space, the lengthening commute, and the happiness and productivity of telecommuting employees, plus "trip reduction" laws like California's (businesses must reduce, by hook or by crook, the number of car trips employees make), are making it easier for employers to say yes.

Jack Nilles estimates that by the year 2000, some 25 million people could be telecommuters. If 50 percent of car commuters were to spend one day a week off the road, the annual gasoline savings would be 2.3 billion gallons. Wear and tear on streets and automobiles would be reduced by 45 billion miles. And since every mile on the road carries the risk of human fatalities, add 765 lives saved, and for good measure, a few million hours of precious time.

DON'T, HOWEVER, IMAGINE WORKING at home is simply a matter of bringing home some work and finding your slippers. The dangers are

TONEE HARBERT



many, and you'll do well to learn from the sad awakenings of others:

- The dang baby has no respect for your privacy. Telecommuting is only an alternative to day-care to the extent that it makes your schedule more flexible. Most telecommuters rely on outside day-care. Even a pet can unhinge a telecommuter. "I tried telecommuting one day," says Ellen Russell, who administers the federal government's telecommuting program, Flexiplace. "I was way-laid by my dog digging up an animal in the yard. I ended up taking a leave day."

- Your co-workers divide up your belongings. Telecommuting consultant Gil Gordon recommends no more than two days a week at home. Otherwise you risk losing your feel for day-to-day operations at the office.

- "Finally! I got hold of you!" If outsiders need to reach you, they may be irked by the extra phone call. They may also assume you're a freelancer or consultant.

- The Bureau of Labor would sue if they saw your crummy office. One of the fringe benefits of

working for the sister magazine to *Old-House Journal* is that

we have old, very beautiful offices. My home office is old, too — old, drafty, and dumpy. Also consider your neighbors. The

teenager next door to my first telecommuting house liked to skip school and broadcast moldy Bob Dylan tunes to the neighborhood. Another woman gave up telecommuting when she discovered that the neighbor's parrot blabbed all day.

- A great tax write-off! Sorry. Your home office-space must be your principal place of business, which rules out part-time telecommuters. Full-timers must prove that the home office exists "for the convenience of the employer." However your accountant interprets this, you'll only know for certain when you're audited.

EVEN IF THE MECHANICAL DETAILS SEEM EASY to master, believe me when I tell you the biggest obstacles will lie beneath your cranium. Some people were just not meant to telecommute.

- Guilt. At first, if the ringing phone caught me peeing, I would panic. "Oh my god — they're going to think I took a day off!"

When I encountered sage federal-government advice on this very dilemma in a brochure ("Use an answering machine."), I cracked up, thinking of all those televirgins who dread being caught with their pants down.

I have matured. Knowing it's an added hassle for people to reach me, I still make a

"I wish there was a time lock on the refrigerator."

—ANDREW SWARTZ
An Apple Computer telecommuter

point of giving great phone service. But inside, I've relaxed. I have realized that the times I wander downstairs for a carrot are the times I would have ambled into the office library, or taken a gossip break.

If you suspect you'd end up in front of the TV with a carton of ice cream, don't argue with yourself. But if you think you can beat the temptations, at least be prepared — Gil Gordon recommends harnessing them. "We tell people to structure their distractions as rewards. Like, 'If I get this report written by noon, I'll go up and watch that episode of *Northwestern Exposure* I taped last night.'" The fact is, you'll probably work with more intensity, and will require more mind-refreshment than you do at the office. Like your supervisor, you'll need to think in terms of results.

- Carrots. There's a special category of temptations that are essential to life, but



which, in too-close proximity, can be deadly: food, friends, and spouses. Some would add cigarettes and coffee.

There are horror stories about people who give up telecommuting as the diet plan of least resistance. "I wish there was a time lock on the refrigerator," sighs Andrew Swartz, who telecommutes three days a week to Apple Computer. Likewise, smokers may find negative reinforcements in short supply at home.

Where spouses and partners are concerned, I have experienced both ends: The telecom-



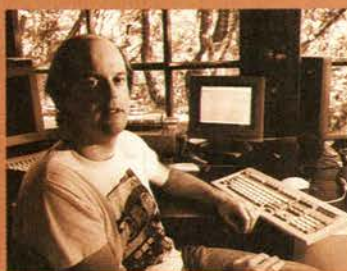
NETWORKING NINE-TO-FIVE

I FOUND MITRA ON THE WHOLE earth 'Lectronic Link, a computer network populated by technophiles and electronic socialites. I'd seen him in other electronic conversations, but when he joined a discussion of telecommuting's future, I e-mailed him.

When I checked my e-mail the next day, he'd responded. As it turns out, Mitra, 33, is a master of e-mail, the electronic mail that computer users can send each other if they belong to the same network. The small San Francisco company he works for recently brought e-mail to Russia.

Whether he's working at the office, or at his house 45 minutes northeast of the city, or in London or Moscow, Mitra (his only name) uses e-mail to stay in touch with clients, co-workers, and friends. When he travels, he stays connected via the company's lap-top computer and modem.

Mitra echoes a complaint common among computer programmers — the home computer isn't as powerful as the office machine. "I tend to save up work for the faster computer," he says. He spends Thursdays and Fridays in the office, filling the evenings with the face-to-face contact that e-mail just can't replace.



muter's partner peeks into the office and says, "I know you're working, but we just got a letter from your rich uncle and he's been diagnosed with ... oh heck, it can wait!" On the other hand, the commuter NEVER experiences a MINUTE of solitude, because you are ALWAYS at HOME. Both roles were difficult, and I would implore anyone considering telecommuting to spend many hours thinking and talking about how the home office will affect domestic bliss, and vice-versa.

Friends are a related treachery. At my house, they inevitably show up when I'm on the phone. There's a cheery knock on the door, the dog bomb explodes, and I'm forced to cut things short. Explain your situation in advance, and good luck — I think it's hard for the office-bound to clearly envision someone putting in a full, pressure-laden day of work at home. And while singles are rare in the telecommuting ranks, we have to deal with the added threat of passing suitors. Some perverse law dictates that they'll come courting on the day you went running before work, were too late to shower, and are working in an old prom dress because everything else is dirty.

DEPENDING ON YOUR WORK, YOU MAY NEED no equipment beyond a good chair to be productive at home — in fact, some companies send employees home to insulate them from all distractions, phone included. But if you need to interact with co-workers and the world, use technology to minimize the distance between you. Generally, the employer provides the equipment and pays for maintenance, as well as phone bills, office supplies, etc.

• **ANSWERING MACHINE:** Essential. It's your secretary, voice mail, best friend. My message often states precisely where I've gone.

• **COMPUTER:** Not necessarily necessary. Even if you use one at work, you may have one day's worth of tubeless work.

• **PHONE LINES:** If you'll do a lot of

phone work at home, you'll probably want a separate line, especially if you have roommates or family.

• **MODEM:** If you pass computer disks around at the office, a modem will allow the same rapid transfer of files from home. My fax and modem share a phone line.

• **FAX:** I need to get and send lots of paper quickly — reader mail, page proofs, press releases. People with similar "hard copy jobs" should be fine with a simple \$400 model, or even a fax-modem.


MY DEPARTURE FROM THE OFFICE WAS AMAZINGLY simple, primarily because Patty was curious and optimistic about telecommuting. I left Brooklyn on a Friday afternoon and, having ordered the phone lines in advance, was open for business in Maine the following Monday, writing, researching, editing, and handling calls from readers and co-workers.

It's seldom that easy. When Cynthia Petty, manager of Apple Computer's "Transportation Evangelism Department," told managers they'd have to let some employees go home to work, nearly half balked. "I got a lot of phone calls saying, 'How dare you do this to us?' It really opened a can of worms."

Most managers are accustomed to managing by observation — if butt is in chair, all's well. Consequently, most managers are uneasy about managing by results — setting goals and allowing employees to meet them how and where they choose. As consultant Gil Gordon says, "The issue isn't what you're doing at 2:00 pm on Wednesday, but come noon on Friday, what do you put on my desk?"

Before you pop the question, get your ducks in a row.

• **Analyze your duties.** The best tasks for home are writing, reading, editing, planning, analysis, and computer work. Can you put together one or two days' worth of solitary work a week? Will your absence create a bottleneck for your co-



workers? How will you demonstrate your productivity?

- Marshall your selling points. If parking or office space is a problem, telecommuting will offer relief. Remember that everyone else's productivity may rise with your own. Sick days will fall. Employee turnover often decreases as well. If your company faces a trip-reduction mandate, make sure telecommuting is on the list of options.

- Involve your co-workers. They will undoubtedly end up taking your messages and filling in little gaps.

- Outline how and when you'll be evaluated for raises and promotions. Under the federal Flexiplace program, no change occurs in employee rights or benefits.

- Be flexible. Some weeks you may not spend a single day at home, depending on circumstances. From week to week, you may need to switch your home days. Your phone-free day at home may sometimes be a phone-access day. The most successful programs are those with the fewest commandments.

***Hannah, remember to add some sort of wrap-up before you modem this to the office tonight ... Bowowowowow! Ooops, UPS man ...

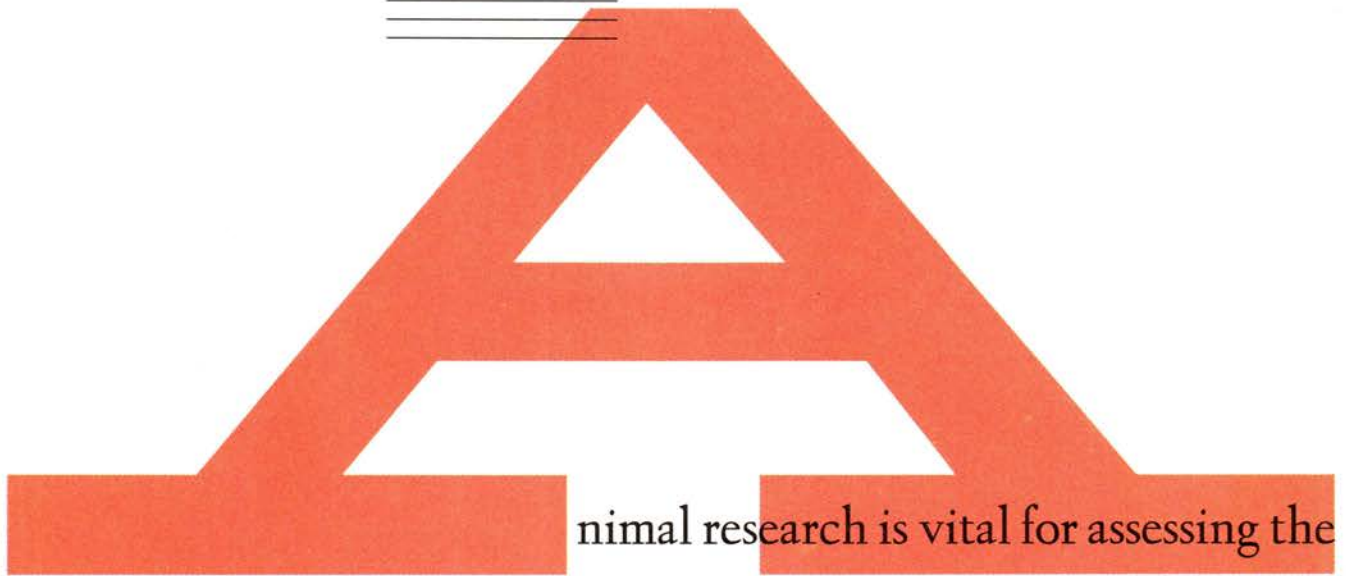
RESOURCES

- **Gil Gordon Associates** 10 Donner Ct., Monmouth Junction, NJ 08852; (908) 329-2266. Newsletter and consulting.

- **Jack Nilles**, at JALA International, 971 Stonehill Ln., Los Angeles, CA 90049; (310) 476-3703. Consulting.

- **Puget Sound Telecommuting Demonstration**. Free executive summary: Washington State Energy office, attn. Telecommuting Program, Box 43165, Olympia, WA 98504-3165; (206) 956-2029.

Why We Need Animal Testing



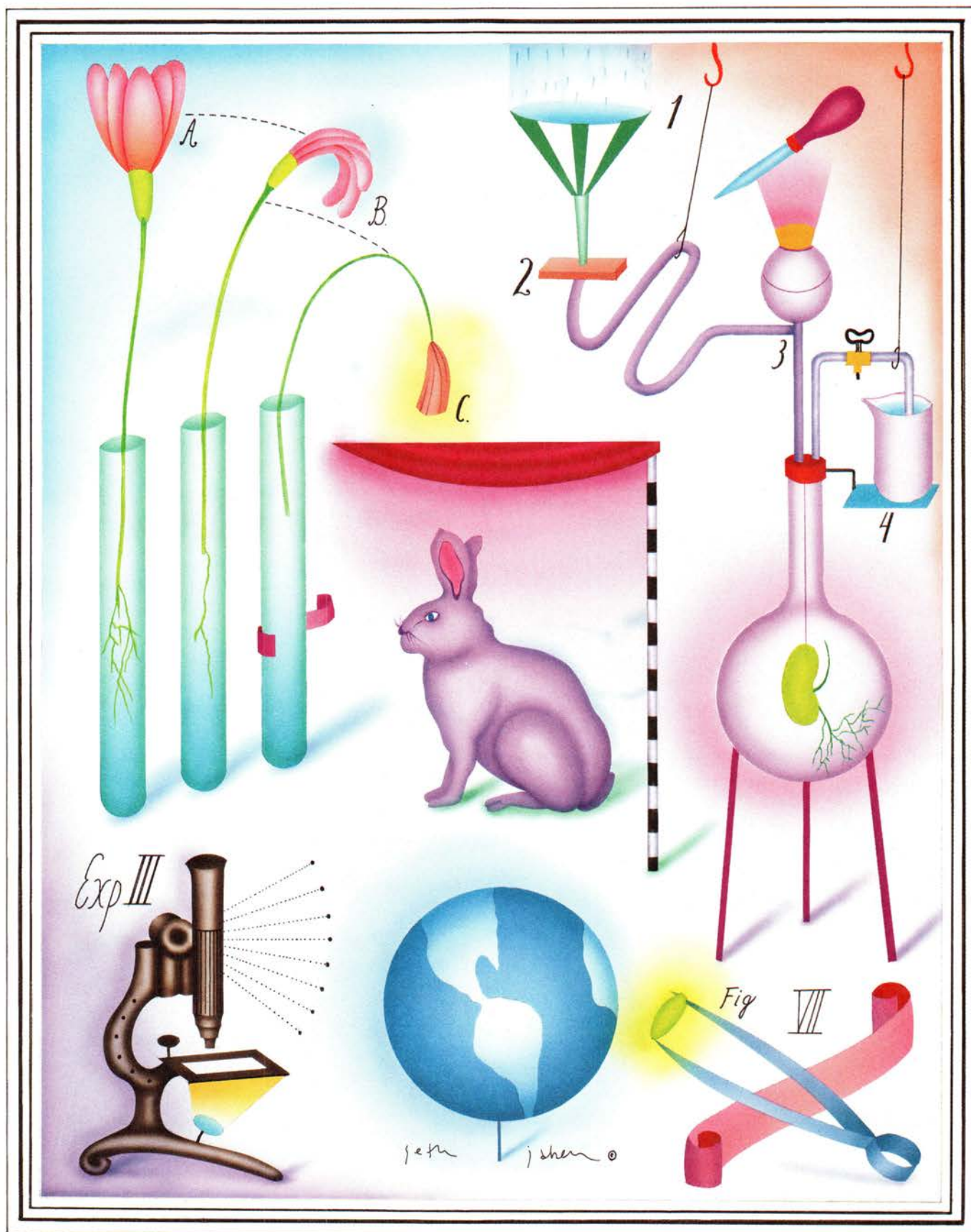
impacts of contaminants on the environment and human health.

Pioneering efforts are underway to develop alternatives to animal testing. But animals are still needed for validating most test results.

Though imperfect, a mouse remains the best model for man. So what are the consequences if activists impede essential animal-research?

BY BILL BREEN

Illustration by Seth Jaben



In 1904, the FDA was still using employees to test food preservatives for toxicity . . . In 1937, an antibacterial sulfa drug made

EARLY IN THE MORNING ON FEBRUARY 28 OF LAST YEAR Richard Aulerich, a Michigan State University professor and a leading researcher on the effects of environmental contaminants on mink, awoke to



Animal-rights vandals destroyed computer disks containing ten years of research accumulated by Karen Chou.

learn that 32 years of work had gone up in smoke.

Members of the Animal Liberation Front, an animal rights terrorist group, had broken into a building on the East Lansing campus and set fire to Dr. Aulerich's office. The vandals poured sulfuric acid on lab equipment and destroyed one of the top research libraries on fur-bearing animals.

Later, the People for the Ethical Treatment of Animals (PETA), an animal-rights group that often makes announcements for the ALF, issued a news release which accused Dr. Aulerich of killing "thousands of mink in painful and scientifically worthless experiments." (It neglected to mention that Dr. Aulerich's research meets strict guidelines for humane care.)

The vandals destroyed other research: The heat from the flames melted all the computer disks in a neighboring office belonging to Karen Chou, an expert on reproductive toxicology. Dr. Chou lost a 10-year accumulation of electronic files.

Like much of the controversy over animal testing, the vandalism at Michigan State is suffused with irony.

Richard Aulerich's research could help northern Michigan's population of wild mink, whose numbers are declining. Mink are highly susceptible to a raft of environmental chemicals, he says, particularly PCBs and dioxins. By feeding mink with contaminated carp from Lake Michigan, Dr. Aulerich is assessing the impact of contaminants on the species' reproductive ability. The EPA has used his research in developing national water quality standards for humans.

As for Karen Chou, her main focus is on the use of animal sperm as a supplement to animal testing, which could result in fewer animals being tested. (Such efforts are endorsed by many in the animal-rights movement.) Working with a group of graduate students who bill themselves the "Sperm Rangers,"

Dr. Chou is attempting to develop a model, using mouse and boar sperm, to test low dose, long-term exposures to various agricultural chemicals.

Exactly one year after the fire, I met with Dr. Chou in her newly restored office. Nearing the end of a two hour interview, I asked one of those TV news questions that's typically lobbed at victims of some tragedy: "How do you feel? Did the fire make you angry?"

"No, not angry," she replied. "We had to get right back to recovering as much data as we could."

She ran her hand through her hair and leaned back in her chair. "But some of that data can never be recovered," she said quietly. "It's gone."

Research Chilled?

ANYONE WHO'S CONCERNED ABOUT THE ENVIRONMENTAL IMPACT of agricultural chemicals, industrial chemicals, household products, naturally occurring substances, even garbage, must look to the science of toxicology, which seeks to limn the harmful effects of contaminants on living things. Toxicological research is vital to our understanding of how substances affect the ecosystem — and ultimately, human health.

"The major concern regarding environmental contaminants is health," says Karen Chou. "The health of animal life, the health of non-animal life, the health of the ecosystem. One cannot determine an acceptable contaminant level in soil, in water, in air, without information from toxicological studies."

And it is the consensus of more than a dozen prominent toxicologists whom I interviewed for this article that such studies cannot be conducted without animal testing.

Sure, scientists debate the efficacy of some types of testing methods, particularly the practice of



Richard Aulerich of MSU surveys his burned-out office.

studying animals stressed to the max with near-lethal doses of compounds. Many would prefer *not* to do animal studies: Animal care is costly, and test results cannot always be accurately

with ethylene glycol (a.k.a. antifreeze) — untested before it was marketed — killed 107 people . . . The Clean Water Act, the Clean

extrapolated to humans. Nevertheless, at some point in research animals are required to answer the question, "Are my findings valid?" And in most areas of research, science doesn't have a better substitute for animals. Though imperfect, in most tests a mouse remains the best model for man.

Yet a highly vocal lobby of people argue that science must value nonhuman life on a par with human life — that "a rat is a pig is a dog is a boy," an Orwellian equation once uttered by Ingrid Newkirk of PETA. Equating the needs of a lab rat with the needs of a sick child, they conclude that all animal testing is wrong, and should be eliminated.¹

Some go to extremes to advance their cause. The msu arson was not an isolated case: The National Association for Biomedical Research has documented 107 "illegal incidents" (dating from 1981) by the animal-rights movement, totaling an

estimated \$7.7 million in damages. Cases ranged from threatening pranks (a ticking package containing a phony bomb left outside the California Primate Center) to large-scale destruction (the firebombing of a diagnostic lab at University of California-Davis).

Even so, there is no empirical evidence which suggests the animal-rights movement has chilled essential animal research. If anything, the number of scientists applying for federal grants and competing for contracts involving animal study is increasing, according to Richard Griesemer, deputy director of the National Institute

of Environmental Health Studies.

However, there is plenty of anecdotal evidence to suggest that animal activists are having an impact.

Several toxicologists, fearing reprisal, declined to be interviewed for this article. After describing his research on dogs, one scientist wondered if his lab would be boycotted. Several others conceded they'd avoided doing studies that required animal testing; or they'd altered a study's design so as to replace animal tests with alternative methodologies which may have been less effective.

"We're cheating," says Fred Oehme, a comparative toxicologist at Kansas State University. "We're cheating when we decide not to test a substance on an animal because of fear of negative reaction, and instead go to a less desirable model like a cell culture. Because a cell culture is a very small part of the homeostatic mechanism, and doesn't give us all the information that we need."

The animal-rights activists force a troubling question: If animal research is impeded, how can scientists effectively

"We're cheating when we decide not to test a substance on an animal because of fear of a negative reaction, and instead go to a less desirable model like a cell culture. A cell culture doesn't give us all the information that we need."

**— Fred Oehme,
a comparative toxicologist at
Kansas State University**

Toxicity Testing Glossary

Acute toxicity test — Tests that are used to detect the toxic effects of single or multiple, large-dose exposures within 24 hours. They're frequently the first tests performed to determine the toxic characteristics of a given substance.

Chronic toxicity test — Lower-dose exposure to a substance, usually over a two-year period.

In Vitro — Meaning "in glass," it pertains to a biological process taking place in an artificial environment, often a test tube or petri dish. Used informally to indicate alternatives to whole animal testing.

In Vivo — Meaning "in the living," it pertains to a biological process taking place in a living cell or organism. Used informally to indicate whole animal testing.

Repeated-dose toxicity test — Measures the cumulative effects of repeated or prolonged, lower-dose exposure to a test substance.

Subchronic toxicity test — Lower-dose exposure to a test substance over a 3-to-6 month duration.

Toxicity testing — The testing of substances for toxicity in order to establish conditions for their safe use.

Source: U.S. Office of Technology Assessment

test and predict the impact of manmade and naturally occurring substances on the environment?

First Test Species: *Homo sapiens*

THE HUGE ADVANCE IN OUR ABILITY TO DIAGNOSE AND TREAT diseases over the past 50 years has, to a great extent, depended on animal research. Is there an animal-rights activist who would refuse vaccines for polio or tetanus; who would say no to insulin for diabetes or chemotherapy for cancer; who would wave off antibiotics against infection, just because they've all been researched and tested on animals?

It used to be that *Homo sapiens* was the preferred animal for toxicity testing. (Animal tox-testing was introduced in the U.S. during the 1920s.) In 1904, the FDA was still using employees to test food preservatives for toxicity (e.g., boric acid, salicylic acid, their derivatives, and formaldehyde). Other test subjects served unwittingly: In 1937, an antibacterial sulfa drug made with ethylene glycol (a.k.a. antifreeze) — untested before it was marketed — killed 107 people.

¹ The first survey on the attitudes of animal-rights activists, conducted by Wesleyan U. psychologist Scott Plous, polled 574 activists. Nearly 80% valued nonhuman life as much as human life; 85% wanted to eliminate all animal research; and more than 60% were in favor of lab break-ins. Interestingly, half thought their #1 priority should be goals other than animal testing (e.g., eliminating the use of animals for food and clothing).

Air Act, and laws governing nuclear- and hazardous-waste disposal, pesticides, and industrial chemicals — are derived from



Veterinarian Christine Williams oversees care of more than 7,500 research animals at MSU.

These days, toxicological research involves a battery of whole-animal toxicity tests: acute tests for determining the effects of short-term, large-dose exposure; chronic and sub-chronic tests to gauge the effects of long-term, lower-dose exposure; repeated-dose tests for measuring cumulative effects of (you guessed it) repeated or prolonged exposure.... all with the goal of evaluating a substance's potential impact on human health. And the environment.

On any given day, hundreds of labs scattered across the U.S. are engaged in some type of ecological risk assessment:

- At Kansas State University's Comparative Toxicology Lab, Fred Oehme is studying the effects of agricultural chemicals on central-nervous system enzymes in pigs. Humans and pigs have very similar enzyme systems for handling organophosphate and carbamate insecticides. By understanding what the known dose of a given agricultural chemical does to a pig's central nervous system, Dr. Oehme can extrapolate that information to predict how the substance will affect human beings.

- Wayne Landis, director of Western Washington University's Institute of Environmental Toxicology and Chemistry, is devis-

ing methods for using the South African clawed frog (*xenopus*) for testing soil toxicity at Superfund (toxic waste) sites. The frog's eggs are nearly transparent, enabling researchers to more easily trace any abnormalities caused by a contaminant on an embryo's development. The results could be used as a yardstick for assessing toxic effects of soil contaminants from Superfund sites on human development.

- University of Wyoming zoologist Harold Bergman recently led a major investigation into acid-rain precipitation in the Northeast and eastern Canada. Researchers examined a variety of trout species, which are particularly sensitive to water contaminants, to gauge the effects of acidification on fish populations in

northeastern lakes. The testing results were used by the EPA to formulate national sulfur-dioxide emission standards.

In fact, much of our major federal environmental legislation — including the Clean Water Act, the Clean Air Act, and laws governing nuclear and hazardous-waste disposal, pesticides, and industrial chemicals — are derived from animal toxicity data.

"If the animal research issue is representative of how society goes about solving its problems, we're in a hell of a mess."

— Christine Williams, of MSU

"We can't protect the environment, or people in general, without doing some animal testing" says Thomas Hamm, a toxicologist and veterinarian at North Carolina State University. "If you're pro-environment but opposed to animal testing you're on very shaky ground, because the two positions just aren't compatible with each other."

Unfortunately, regulatory demand for validated results — particularly from carcinogenicity testing — has far outstripped the toxicological community's ability to produce them.

animal toxicity data . . . 1,000 to 1,200 chemicals have been adequately tested on animals for carcinogenicity. In contrast, close

"We've collected [carcinogenicity] information on 450 chemicals over 20 years of long-term animal studies," says Dr. Griesemer of the National Institute of Environmental Health Sciences. "Altogether, about 1,000 to 1,200 chemicals have been adequately tested on animals for carcinogenicity."

In contrast to those numbers is the world of compounds, comprised of more than 13 million chemicals. Close to 100,000 of these are on the world market but have not been adequately tested. "The numbers tested to date," notes Dr. Griesemer, "are very, very small."

One can't help but wonder why environmentalists aren't clamoring for *more* animal research.

Demise of the LD₅₀

THOUGH SOME SCIENTISTS CHARGE GROUPS LIKE PETA WITH A WARPED ethic that places animals before people, it's a mistake to assume that *all* activists are militant abolitionists bent on banning testing. Thoughtful activists such as Martin Stephens, vice president of lab-animals programs for the Humane Society of the U.S., acknowledge the need for some types of testing — although Dr. Stephens hastens to add that the number of animal tests, and the numbers of animals tested, can be greatly reduced.

All of the toxicologists I spoke with agree with this view. Ethical questions aside, they note that *science* has evolved to the point where new testing methodologies can give a wider range of data using fewer animals. Consider the reconfiguring of the LD₅₀ test, once the yardstick for measuring acute toxicity.

Originally designed in 1927 as a methodology for evaluating pharmaceutical preparations, the classical LD₅₀ ("lethal dose — 50%") measures acute toxicity by determining the exact dose which kills exactly half the animals tested. Such precision requires a large number of animals (usually rats and mice) — in the range of 60 to 200 per test.

Some scientists, who dubbed the test "kill 'em and count 'em," argued against the LD₅₀. They asked: Why require such exacting statistical precision when determining lethality? If a dose kills half the animals — more or less — that should be sufficient. Why not use an *approximate* lethal dose (ALD), which allows researchers to test a new compound by feeding it to one rat at a time, at varying doses which increase by 50%. The ALD and other procedures, such as the Up and Down Method, require no more than 10 animals. They can also provide additional information on the duration, severity, and the potential reversibility of induced toxic effects.

Richard Hill, a science advisor in the EPA's pesticides and toxic-substances program, notes that the agency actively discourages use of the classical LD₅₀. As a first step in evaluating toxicity, the EPA uses computers to track acute toxicity information on compounds with similar structures and known LD₅₀s. If researchers can base a judgment on toxicity solely on this analysis, they need not proceed with animal tests.

"Science has moved on," says Alan Goldberg, director

High Dose for Rats, No Risk for Humans?

ANOTHER TRADITIONAL METHOD THAT'S LONG BEEN a focus of controversy among toxicologists is the maximum-tolerated dose test.

The MTD, the principal method of determining potential carcinogenicity in substances, is the highest dose that can be administered without the test animal showing life-threatening signs of toxicity. After feeding large doses of a chemical to rodents for two years, the results are extrapolated to predict the effects of far smaller doses on people. Scientists have favored the MTD because it cuts down on the number of animals — and thus the cost — required to obtain statistically significant results.

But researchers have become increasingly suspicious of MTD's value, in light of evidence that metabolism, repair, and other physiologic effects are altered by the high doses and may not reflect what happens at lower doses.

In an article in the 31 August '90 issue of *Science*, Bruce Ames, a prominent toxicologist at the University of California-Berkeley, argued that when very large amounts of a chemical accumulate in an animal, they accelerate cell death and the proliferation of new cells — a process that is known to increase the chance of a cell acquiring a cancer-causing mutation. Dr. Ames pointed out that some chemicals administered at doses substantially lower than the MTD are not likely to increase mutations and could therefore be harmless at lower levels.

Such arguments have led many scientists to conclude that the MTD studies are too inaccurate to form the basis for evaluating risks to humans.

Recently, a National Academy of Science panel on risk assessment issued a report which recommends continued use of the MTD — as well as doses below the MTD — to determine whether a chemical has the *potential* to produce cancer. If the test results are negative, no additional carcinogenicity tests would be required. If the results are positive, a battery of other tests would assess the substance's absorption, distribution, metabolism, storage, excretion, and other physiologic factors in order to reduce uncertainties in assessing cancer-risk.

The report also makes a telling observation: The MTD was designed to determine solely whether chronic exposure to a substance causes cancer in animals. Now, society asks toxicologists to not only predict whether chronic exposure causes cancer in *humans*, but also to determine the amount of exposure (dose) at which cancer may occur.

to 100,000 chemicals are on the world market but have not been adequately tested . . . Many species of trout, which are

Animal Testing Alternatives

Alternatives to whole animal testing are best summarized by the three Rs, introduced in 1959 by W.M.S. Russell and R.L. Burch in their book *The Principles of Humane Experimental Technique*. Too often, alternatives are defined solely as methods which *replace* whole animals. In fact, methodologies which *reduce* the number of animals used in testing, or which *refine* techniques so as to eliminate the pain or distress an animal may experience, are also alternatives. Below are the major alternative testing methods.



In vitro – Tests using living cells, tissues, or organs, thereby greatly reducing the number of whole animals used. Major disadvantage: These tests cannot produce the complete physiologic responses of the whole animal.



Microorganisms – Increased emphasis is being placed on using bacteria and fungi to measure certain genotoxic effects. Their genetic makeup is simple, making a change in the genetic material relatively easy to detect.



Invertebrates – Certain aspects of invertebrates' physiology are sufficiently similar to mammals to make them useful in toxicity testing. The sea urchin has long been favored for some types of screening for reproductive toxicity and mutagenicity.



Computer models – In some cases, mathematical and computer models can supplement information from in vitro testing. Current models are limited by incomplete understanding of the mechanisms by which toxic effects occur.



Epidemiologic data – Studies of specific groups of people who were exposed to a known substance. Such studies detected carcinogenicity as early as the 18th century. Major disadvantage: Data are usually collected "after the fact" of damage to humans, and must then be confirmed by laboratory tests.

Sources: The Johns Hopkins Center for Alternatives to Animal Testing; U.S. Office of Technology Assessment

of the Johns Hopkins Center for Alternatives to Animal Testing. "And because there are acute-toxicity tests that are more sophisticated, it was clear that the classical LD50 was an appropriate test for the animal-rights community to attack."

Societal concerns over lab-animal welfare and new advances in toxicological research are also fueling a push to alternative testing methods based on *in vitro* systems, which are broadly interpreted to mean tests that do not involve whole animals. (See "Animal Testing Alternatives," above.)

In vitro testing encompasses a spectrum of methods, rang-

ing from analyses of bacteria and invertebrates to the study of the (above-noted) sperm cells and frog embryos. Perhaps the hottest area of toxicological research is in the field of molecular biology, where researchers use ultrasensitive probes to discern toxic effects in human blood and urine cells. Such investigations could enable researchers to answer the question of human toxicity more directly, without extrapolating data from animal studies.

Even so, alternative methods are incapable of replacing *all* animal testing because of this fact: Computers and cell cultures cannot completely mimic the complex biochemical inter-

particularly sensitive to contaminants, are used to gauge effects of acidification on fish populations in northeastern lakes.

actions that occur in a whole animal. Toxicologists generally agree that in most research, the reactions of rats and rabbits and other mammalian species still provide the best means of evaluating the toxicity of compounds in human beings.

"At the end of any alternative-testing method, we've got to find out whether the chemical can damage the whole animal," says Lawrence Fischer, director of MSU's Institute of Environmental Toxicology. "Without taking that step, there's no way that anybody could in good conscience apply the results to human beings."

In the Lab

WHAT GOES ON BEHIND LAB DOORS? TO FIND OUT, I KNOCKED ON ONE. Christine Williams answered.

Dr. Williams, a veterinarian and director of MSU's lab animal care facility, gave me a tour of the place — which holds more than 7,500 animals. Here, rabbits sit in stainless steel cages costing \$4,000 apiece. Rats bed down in aspen wood chips. Mice breathe air that's purified by sophisticated filters, ensuring that the animals remain free of pathogens.

Some sanitary measures are required to safeguard experiments: Viruses would interfere with a researcher's ability to trace a synthetic compound's effect. Some measures are required by regulators: The MSU facility is continually visited by federal, state, and private inspectors. Taken together, the standards are enough to make the 5,000-acre campus the envy of many medical practitioners from underdeveloped countries.

Dr. Williams tells me that local people have a standing invitation to visit the facility. "Most won't come, and the few who do say we're hiding something," she says. "What more can we do? If the animal research issue is representative of how society goes about solving its problems, we're in a hell of a mess."

In 1985 Congress enacted the Health Research Extension Act, which codified practices already in place at federally funded facilities. The Act requires institutions to establish review committees (which include a veterinarian and a member of the public, in addition to scientists) to ensure that a proposed experiment complies with animal-care guidelines. That same year, the Animal Welfare Act of 1966 was amended to enhance institutional scrutiny as well as governmental. It requires institutions to establish "Animal Care and Use" committees, similar to the hospital boards which review research using human subjects.

Most scientists acknowledge that the laws have encouraged more efficient use of animals. But some complain they've been entangled in webs of regulatory paperwork which fail to improve animals' well-being. Others argue that some regulations haven't been thought through, such as the Welfare Act's requirement that institutions improve facilities so as to "promote the psychological well-being of non-human primates" — at an estimated cost of \$408 million.

The National Institutes of Health's Office of Protection from Research Risks, which investigates all claims of animal mistreatment, reports that most complaints come from the institutions themselves. In the past six years, the department has uncovered just *one case* where an institution tried to cover up a legitimate claim.

MY TOUR OF MSU'S LAB-ANIMAL BUILDING ENDED IN A CLOSET-sized library. Herein raged a battle of books: treatises delimiting the Academy's just cause for animal research vs. fliers decrying animal torture. Scholars invoked the Great Thinkers: Saint Augustine and Saint Thomas, Hegel and Kant and Darwin. Ranged against them were photos of a kitten with electrodes protruding from its brain, and the crazy, compelling illogic of "a rat is a pig is a dog is a boy."

Judging the debate from a public-relations standpoint, I'd say the activists have the upper hand.

Even scientists generally concede they've done a pretty poor job of exposing the public to the whys and hows of animal research. Part of the problem is that scientists prefer to com-

"We can't protect the environment without doing some animal testing. If you're pro-environment but opposed to animal testing you're on shaky ground, because the two positions just aren't compatible."

— Thomas Hamm, veterinarian, North Carolina State University

municate amongst themselves. When they do face the public, they can sound paternalistic.

In my talks with toxicologists, I asked them to respond to the rat=boy equation. Mostly, I got blank stares. One sputtered that there are great physiologic differences between a rat and a boy. He then set about explaining each of them.

But as I think back to my conversation with Karen Chou, the equation takes on a certain resonance, and I begin to see how it can be used to explain the *need* for testing.

Almost all living organisms live at the expense of other organisms. Certain tree species grow faster than others, thus winning the competition for sunlight. Chimpanzees in the wild have been known to feed on smaller primates. The developer's bulldozer kills innumerable invertebrates. Each species, rat and boy, must continually wage its own quest for survival.

"The natural laws do not protect any single species," said Dr. Chou. "Every species must confront unpredictable challenges. The human species is continually confronted by new bacteria, new contaminants, new diseases. And that's why we must continually increase our knowledge in the natural sciences, in medicine, in toxicology, in all the basic sciences."

We are being challenged by the natural processes. The question is, how do we best prepare to meet these challenges."

Dr. Chou left no doubt in my mind that part of our defense depends on animal research.

The results were used by the federal EPA to formulate national sulfur-dioxide emission standards for industry.

DO-IT-YOURSELF PHOTOVOLTAICS

BY JOEL PATTERSON

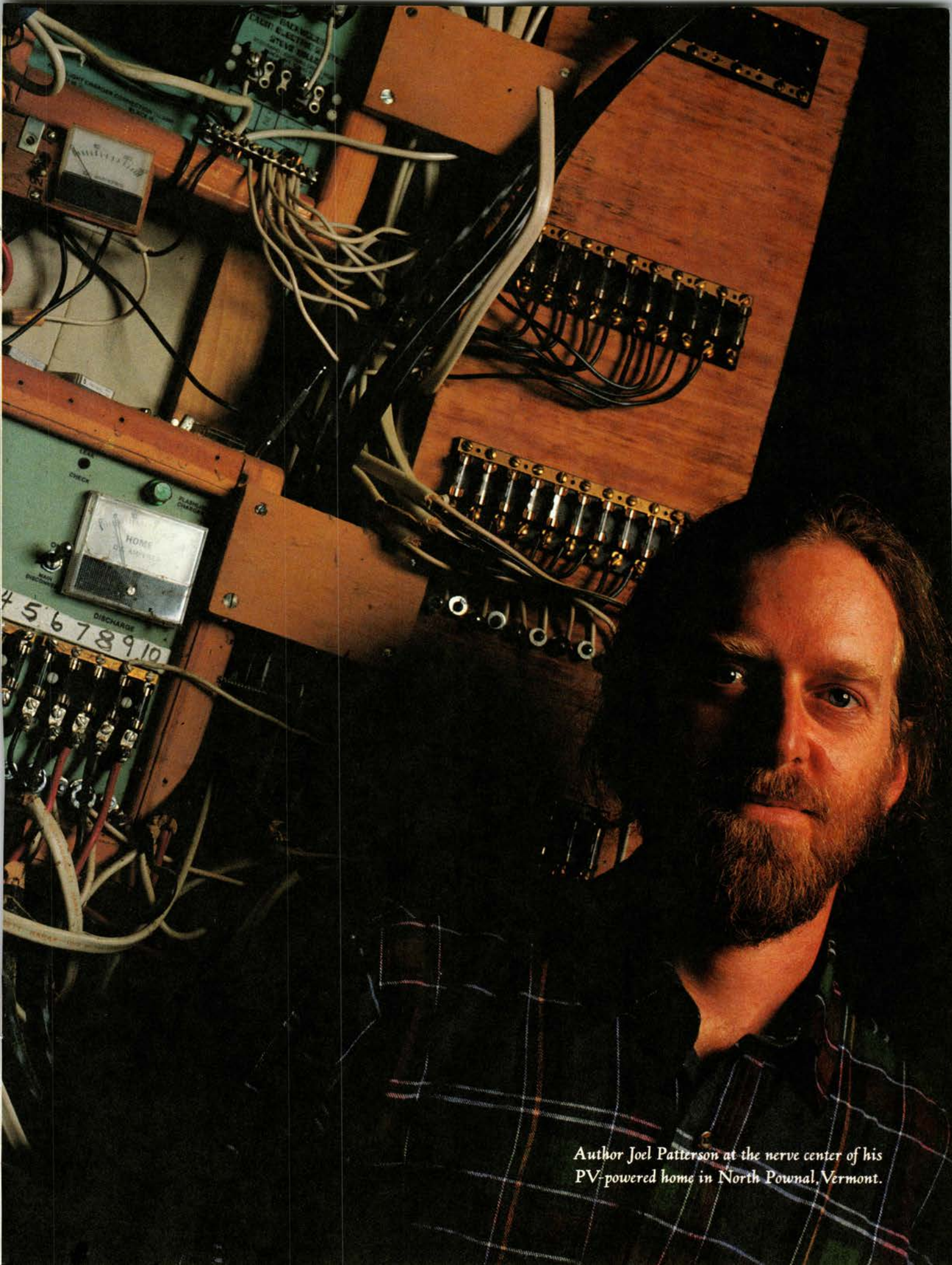


The '70s energy crisis jumpstarted photovoltaic (solar) power; then the oil-glutted '80s rained on PV's parade. For now, it doesn't make sense to go solar if you're already on the grid. But in areas where power lines are distant, solar power is already cost-effective. It's also doable, versatile, and non-polluting. Here's one man's story....

Photography by STEVE MARSEL

HERE COMES THE

SUN



Author Joel Patterson at the nerve center of his
PV-powered home in North Pownal, Vermont.

OF ALL THE RENEWABLE RESOURCES, AS SHAKESPEARE might have put it, there is nothing like the Sun. For one thing, it's got name recognition. For another, the Sun has a long-standing policy of free delivery to just about anywhere. And it's a quality product: sunshine makes for cheerier picnics and rosier cheeks; it has heating value, and it can be converted on-the-spot into electricity. In our ever-changing world, solar is used to power our calculators, walkway lights, highway emergency phones, households, businesses.... The science is called photovoltaics, or PV.

Once upon a time, and it wasn't long ago, you had to be Neil Armstrong to get near solar-electric cells. Today, PV is a workaday industry employing from 5,000 to 10,000 souls in the U.S. alone. The largest major domestic producer is Solarex in Rockville, Maryland, owned by Amoco Oil. (In years to come, look for them to become Amoco Energy.)* Siemens of Germany and Kyocera of Japan are other major players scrambling to capture what is certain to be a mushrooming market.

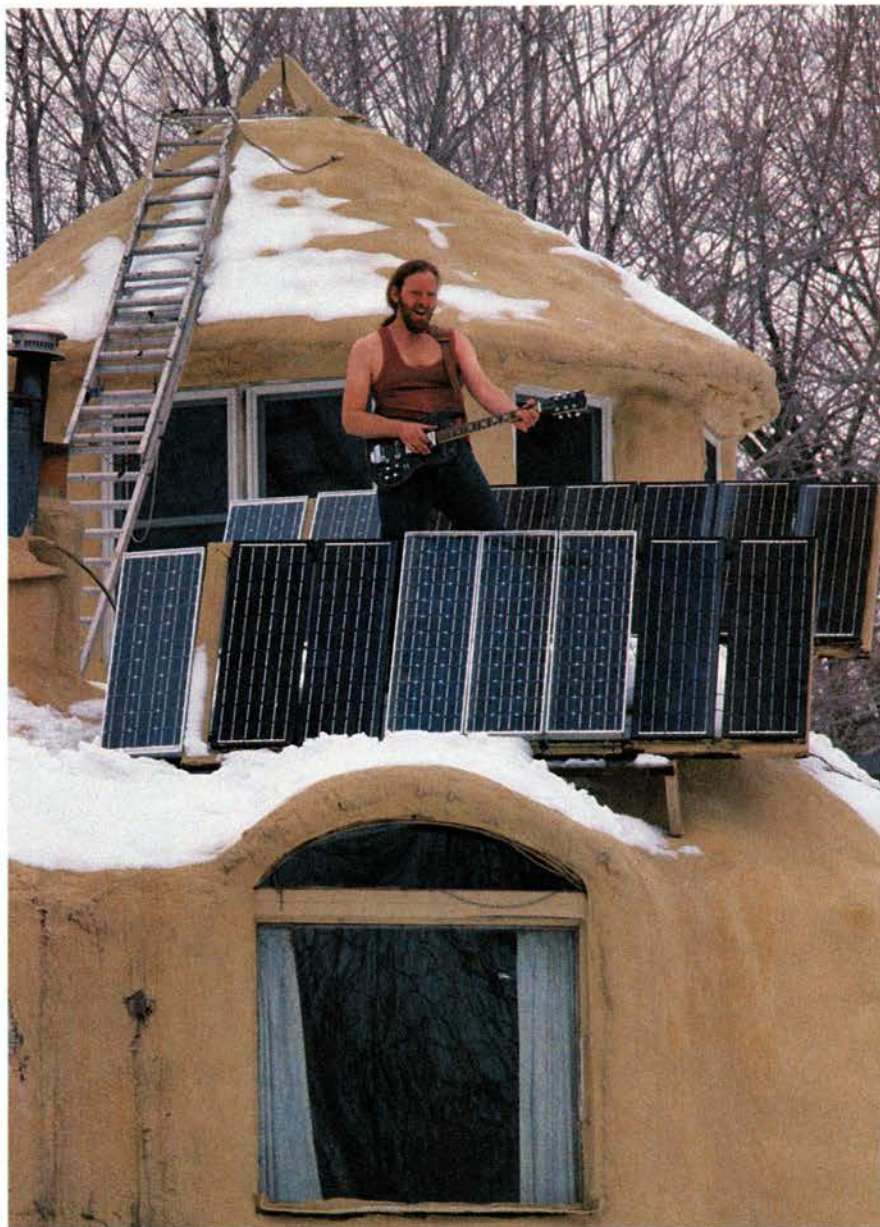
The beauty of PV is that it meshes so well with the standard gears of modern, off-the-shelf technology. PV panels work at 12 volts DC (direct current), as do cars and trucks and their batteries, as well as RVs and the universe of RV appliances from radios to refrigerators. If you can look up and see the sky, you're looking at a whole new power source.

LET THERE BE LIGHT

— Genesis

IN TRUTH, THIS POWER SOURCE IS ANCIENT. IN 1839 A Frenchman, Edmund Becquerel, observed that when sunlight struck certain metals, an electric current was created. I have a dream where I'm working with Edmund in his shop, and I whisper in his ear, "Paula Abdul videos. Play them on my VCR." I see a broad smile creasing his face. He's visualizing all the electric gadgets that could be created, if the world would only seize on his invention and develop its potential. Just think: He could create a paradise of electric motors working off the sun! There's a crazed glint in his eye as he considers the fame he could garner from such a breakthrough. A disturbing dream. I'm not sure what it means. Actually, it took Bell Laboratories in the 1950s and NASA's space program later to realize affordable solar power. Tough luck, Eddie.

If you can think of sunshine as a steady rain of electricity, free for the taking, you'll appreciate the simplicity of the archetypal PV system. Witness the outdoor lighting system. We're seeing more and more of these simple, black walkway lights. During the day, a teensie solar cell soaks up sunshine and charges a small battery. At night, the battery shines



Up on the Roof: 16 one-foot by four-foot PV panels collect a steady rain of electricity, powering lights, amps, guitar. ...

a light to wend you on your way. An electric eye senses when to turn it on and off.

The citified archetype is the bus-stop lighting system, which works on the same principle. All through the day's traffic and noise the solar cells charge the batteries. At night, voila! A brightly lit bus stop: a bit of security, a bit of convenience, the epitome of civilization. To much of the developing world, unburdened by an existing power generating apparatus, solar-powered electric systems — non-polluting, easy to use, locatable anywhere, and portable — look inviting indeed. Solar-electric water pumping and solar-electric vaccine refrigeration, to name just two examples, are revolu-

* THIS IS ENTIRELY BASELESS SPECULATION.

WE CAN ALL HAVE THE WONDERS OF ELECTRICITY, WHEREVER WE ARE — DOING WHATEVER WE WANT.



tionizing life in these quarters.

In the farm country where I live, the electric-fence charger is the most common pv system: it's compact, adapted to a specific use, and maintenance-free. We got one for \$185 at the local feed and grain store after a marauding bear tried his own product testing on our beehives.

A teenie-weenie pv panel, smaller than an airline breakfast plate, sits atop a closed box that houses the battery. This ten-pound unit is tacked to a fence post. The wire to be electrified is thread around insulators on other fence posts and attached to a terminal on the front of the box. Another wire is grounded. (In our woods I have found ceramic insulator, once tacked to trees, now completely buried under years of new growth and bark — this electrified fence business must be as old as the Pilgrims.) The pv panel charges the battery, and the battery waits to deliver a jolting zap to any ground that touches the wire — fish, flesh, or fowl.

Having set it up, I had to make sure it works. It is my sworn testimony that it gets your attention. The bear must concur. The beast continues to wear a path around the perimeter, cursing the pv pioneer and all his begotten. See, Eddie? The bear remembers.

Our house in southern Vermont — not necessarily the sunniest place on Planet Earth — is a larger variation on this theme. Sixteen regulation-size (one-foot by four-foot) pv panels on the roof charge 26 "golf cart" batteries in the basement, from which all virtues flow: lights, refrigerator, washing machine, this typewriter, the vcr for "Reading Rainbow" and "Justify My Love." We have a propane-fired generator to top off the batteries during those (few) dreary winter weeks. This is a "stand-alone" system — no connection to the local utility at all.

When we were building in 1985, Central Vermont Public Service wanted \$8,000 to run their line up our driveway. When we heard they would bill us monthly — about

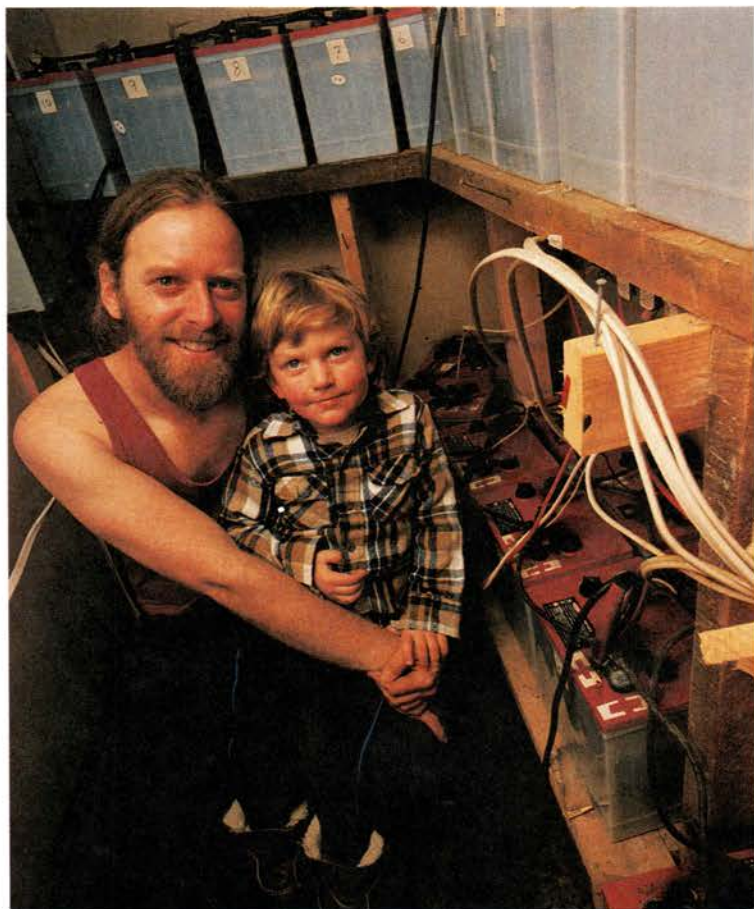
HOW SOLAR POWERS

THE SUN SHINES ON A PV PANEL OR MODULE, WHICH is a set of silicon wafers or amorphous films encased in water-proof housing. Positive and negative terminals are mounted on the back. A slice of crystalline silicon creates electricity when struck by light; while amorphous films are ribbons of silicon material that do the same thing. A panel is rated by the watts it produces in full sunlight. The 75-watt panel is standard.

Sunlight striking a solar cell creates a direct current, which flows through metal grids on the panel's surface and charges a battery. Lead/acid, nickel cadmium, and other types of batteries store electrical power. Often, an inverter is used to convert 12-volt DC power into house current (120-volt AC power).

The total pv package includes panels, batteries, an inverter, and accessories. A pv system for an average-sized house requires about 15 pv panels, a battery-bank inverter that includes a series of batteries, and a backup mechanical generator for cloudy days. The total system costs about \$9,000.





Joel, with son Daniel, downstairs in the "battery room": 26 solar-powered golf-cart batteries keep the house humming.

\$45 for the average American household during autumn months—our decision was made for us. What is it, 1993?

Can that really be \$4,320 we've saved in electric bills, and counting? If President Bill Clinton's proposed BTU tax is enacted, we'll save an additional \$100 to \$150 per year (the cost to the average family) because the tax exempts solar and wind power.

BRIGHT SUNSHINY DAY

—Johnny Nash

GRID ELECTRICITY IS AN EXPENSIVE PROPOSITION. IF THE costs total anything over the \$8,000 for the initial hookup (1/4-mile distance in typical rural areas), the pv alternative is far and away the cheaper option. Something like \$8,000 to \$10,000 of pv will equip a modern house with every convenience (as it has ours) and will be indistinguishable from its grid-connected brethren. One caveat: The house must be moderately efficient with its power usage, and not contain mass-consumption, resistance-type heaters like electric stoves and baseboard heat. (For \$16,000 to \$20,000, you can have the stove and baseboard.) A heavenly host of peripheral advantages accompany the pv option, speaking to all the shopworn clichés: environmentally benign, silent, reliable, secure. No blackouts.

Today, pv is a teenager doing \$200 million in business annually. (As a comparison, real teenagers bought \$600 million worth of tapes and cds in two weeks of December 1991, according to *Rolling Stone*.) It has its own trade journals, conferences, and for all I know, cult films. What the pv industry needs to come out of its adolescence is infrastructure. As Richard Perez of *Home Power* magazine observes: "The majority of people are

THE YELLOW PAGES

What can you do to get into the exciting new world of solar electricity (a.k.a. pv)? First, identify a need. An outdoor lighting system? A sound system on the tennis court? Are you seeking the barest luxuries for a remote campsite, cabin, or building? Are you building a new house, adding on, or remodeling? (Suppliers of security/alarm systems tout the irreproachable reliability of a pv system: no power interruption, whether surreptitious or unintentional • Remember that pv systems are entirely self-contained, and adaptable from the smallest needs to the largest. And, in a phrase both idiotic and true, once they're paid for, they're free. • So, are you sitting by the phone imagining all the lovely things you could do with photovoltaics if only you knew whom to call? • Here's whom to call:

► Photovoltaics

Active Technology PO Box 1553, Placerville, CA 95667 (800) 366-9316
Alternative Energy Engineering PO Box 339, Redway, CA 95560 (800) 777-6609
Atlantic Solar Products PO Box 70060, Baltimore, MD 70060 (401) 686-2533
Backwoods Solar Electric Systems
 8530 Rapid Lightning Creek Rd, Sandpoint, ID 83864 (208) 263-4290
Blackhawk Solar PO Box 1468, Quincy, CA 95971 (916) 283-1396
ECS Solar Power Stations 4110 SW 34th St, Gainesville, FL 32608 (904) 373-3220
Fowler Solar Electric PO Box 435, Worthington, MA 01098 (413) 238-5974
Independent Power & Light RR1 Box 3054, Hyde Park, VT 05655 (802) 888-7194
Integral Energy Systems 109 Argall Way, Nevada City, CA 95959 (916) 265-8441

Kansas Wind Power Route 1, Holton, KS 66436 (913) 364-4407
Lake Michigan Wind & Sun 3971 E Bluebird Rd, Forestville, WI 54213 (800) 366-9316
Real Goods 966 E Mazzoni St, Ukiah, CA 95482 (800) 762-7325
Siemens Solar 4650 Adehr Ln, Cammarillo, CA 93010 (805) 482-6800
Solar Car Corp 1300 Lake Washington Rd, Melbourne, FL 32935 (407) 254-2997
Solarex 630 Solarex Ct, Fredrick, MD 21701 (301) 698-4200
Solar Spectrum 4622 W Kyes Rd, Tomahawk, WI 54487 (715) 453-2803
Sunlight Energy Corp 4411 W Echo Lane, Glendale, AZ 85302 (800) 338-1781
Sunnyside Solar RD 4, Box 808, Green River Rd, Brattleboro, VT 05301 (802) 257-1482
Wm Lamb Corp 10615 Chandler Blvd, N Hollywood, CA 91601 (818) 980-6248
Zomeworks Corp
 1011 A Sawmill Rd, Box 25805, Albuquerque, NM 87125 (505) 242-5354

no more likely to install their own PV system as they are to install their own plumbing. We need to be able to open the phone book in any town and find a choice of dealers who will sell and install a system." Until then, check the Yellow Pages on page 50.

The approximately 50,000 homes (some estimates are higher) that are off the grid and powered by renewable energy are just the crest of the wave to come. We're talking tidal wave.

Predicts Steve Rubin of the federally sponsored National Renewable Energies Laboratory: "In twenty years, you won't need to write this article. PV panels, batteries, inverters ... everyone will be living with them. It's" he hesitates, unsure if this is sounding moonbeamish, "... inevitable."

"Why?"

He sighs — I've heard this sigh. It's the sigh of a man who has a blistering truth he doubts the world is ready for.

"Because sunshine is free. The collection system isn't free, but the energy is."

If this is true, then why didn't prices drop substantially in the 1980s? "We're caught in a kind of Catch-22 situation right now," Steve continues. "As prices drop, more applications become feasible, so there's more demand. But if there was really mass-production of PV modules on a vast scale, the price would drop so low it would be affordable for every application. PV would liberate electric life from the grid, from the necessity of running a wire for umpteen jillion miles or relying on a generator. The potential is tremendously exciting."

GOOD DAY SUNSHINE

— The Beatles

ALL WE NEED NOW IS A METAPHOR TO SIGNIFY THE PROMISE OF PV. I think we've found our candidate — the lowly Walkman. Goes like this:

Way back when, "music" meant live music, folk dancing, and symphony orchestras. The advent of recording brought great musical performances to the masses, to soothe and excite the savage beast. Even so, you were tethered to a phonograph. The radio was portable, but you had to submit to the tyranny of the D.J. — sometimes a good bargain, sometimes not.

But nowadays you can have state-of-the-art sound wherever you roam, river deep or mountain high, and programmed to your individual liking. In the same way, now we can have all the wonders of electricity, wherever we are — doing what we want done.

I was a skeptic when our first PV panels arrived via UPS. I thought, "How can this work, I mean, really?" Years of PV living have opened my eyes, and one day it dawned on me. It does work.

Touché, Eddie.



Joel Patterson lives off the grid in North Pownal, Vermont, with his wife and two children. He's currently building a solar-powered recording studio.

TO LEARN MORE...

Workshops

Many states have outreach programs run by their Departments of Education, Energy, or Environment. Florida's is outstanding.

✧ **Florida Solar Energy Center**, 300 State Road #401, Cape Canaveral, FL 32920; (407) 783-0300.

The 6-hour workshop, held 15 times annually, supplies schoolteachers with kits (worth \$100) of PV cells, motors, solar-box oven materials and et ceteras, with a curriculum guide for classroom instruction.

✧ **Solar Technology Institute**, P.O. Box 1115, Carbondale, CO 81623-1115; (303) 963-0715.

Non-profit educational organization teaching "hands-on, how-to" skills in renewable energy. Spring/Summer/Fall classes.

Groups

✧ **American Solar Energy Society**, 2400 Central Ave., Suite G-1, Boulder, CO 80301, (303) 443-3130.

National organization dedicated to promoting use of solar energy. Publishes *Solar Today* magazine (\$25/yr.) and an encyclopedic book, *Advances in Solar Technology* (\$125). Organizes Solar Action Network, with regional chapters throughout the country.

✧ **Conservation and Renewable Energy Inquiry and Referral Service**, Box 8900, Silver Spring, MD 20907; (800) 523-2929.

Information service of the U.S. Dept. of Energy. Distributes fact sheets, information briefs, and bibliographies on energy conservation topics and renewable energy technologies.

✧ **National Renewable Energy Laboratory**, 1617 Cole Blvd., Golden, CO 80401-3393; (303) 231-1000.

President Bush, bless his soul, elevated the status of the old SERI from an Institute to a National Laboratory. The primary location for federal research and development in PV, bio-fuels, wind, and more.

Journals

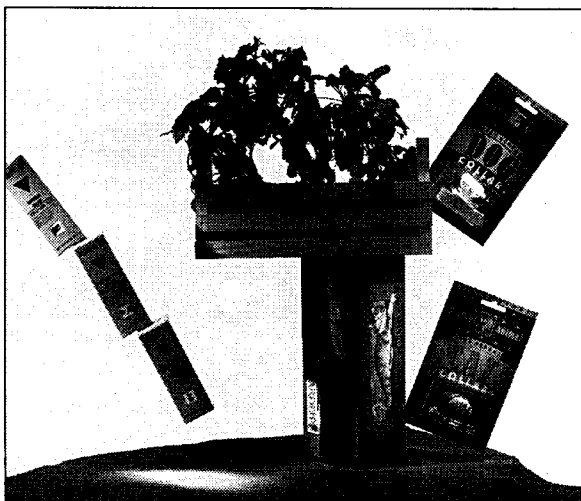
✧ **Home Power**, P.O. Box 520, Ashland, OR 97520; (916) 475-3179; (\$15/yr.). Covers the culture of folks who make their own electrical power in small-scale systems using renewables: PV, micro-hydro, and wind. Explores issues and technical details.

✧ **Independent Energy**, 620 Central Ave. North, Milaca, MN 56353; (800) 922-3736; (\$78/yr.). Ouch! Business magazine for the independent power industry, giving insights and analysis to corporate executives, power project developers, owners, and operators. An in-depth look at the PV industry.

✧ **PV Network News**, 2303 Cedros Circle, Santa Fe, NM 87505; (505) 473-1067. "Solar Electricity Today" (\$7) is their directory listing over 800 books, catalogs, newsletters, dealers, mail-order shops and manufacturers of PV and renewables equipment. Videos (\$35/per) on "PV Places," "Short Course in PV," and "PV Meets the Code."

✧ **Solar Industry Journal**, 777 North Capitol St. NE, Suite 805, Washington, DC 20002; (202) 408-0660; (\$25/yr.). Quarterly overview of current trends nationally and internationally. Exhaustive summaries of laboratory research, projects, conferences, politics and legislation, tax credits and government programs.

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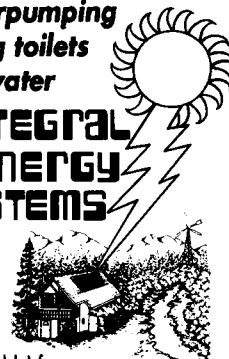
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KENAF IS A TALL, SPINDLY plant that grows like a weed and can be made into paper. In fact, kenaf makes a "cleaner" paper than wood. The fibers are lighter in color, and so require less chemical bleaching. They're also more bulky, so less fiber is needed per sheet. And kenaf has a lower lignin content (the sticky resin that holds wood fibers together) than wood, meaning less processing is necessary.

As for growing kenaf, farmers can get eight to ten tons per acre each year, as opposed to four or five tons for wood. Though kenaf farming is just beginning, there's hope that rotating the plant with soybeans will maintain healthy soil.

If you want to give kenaf a test drive, you can order kenaf paper from Earth Care Paper, which offers two sizes plus envelopes in soft white. But clear it with Purchasing first — 500 sheets of 8 1/2" x 11" costs \$18.95.

(Earth Care's most popular recycled paper is on sale at \$4.95.) It's the same old story: As the product catches on, and is made in bigger batches, the price will drop.

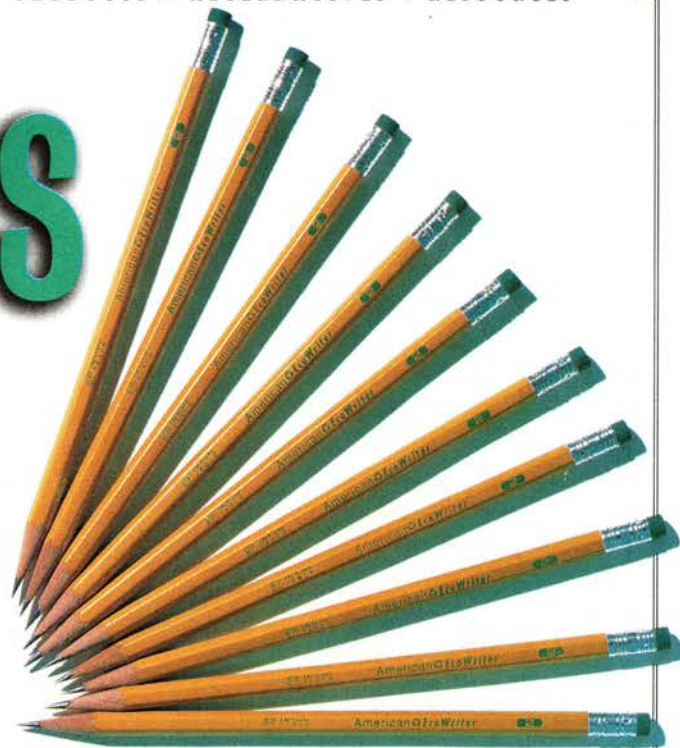
Earth Care Paper Inc., Dept. GM., P.O. Box 7070, Madison, WI 53707; (608) 223-4000.

Water Watcher

HERE'S A SIGN OF THE times — a locking case to protect your outdoor faucets from children and other water wasters. Seriously! With the drought in California, normal people have actually taken to lives of crime, filching water from their neighbors to avoid paying penalties for their own overuse.



The Water Guard is a cylinder that pops apart like the old L'Eggs capsule. You then clamp it back together around the water source you wish to protect — a hose bib, sprin-



kler, or other valve. Lock it, and breathe easy. Your water is safe.

Well, the unit is sturdy plastic, so anyone bent on theft could achieve his goal with a hammer. But then, this might come in handy when you accidentally bury the keys in the garden.

Check big discount stores, or send \$6.99 ppd. to: Jawz, Inc., P.O. Box 1295, Fallbrook, CA 92088; (619) 728-8380.

Good News Pencil

OF COURSE YOU WOULDN'T write on kenaf paper with a disposable ball-point pen — enter EF's EC (environmentally correct) pencil. Eberhard Faber has been making pencils for a long time, but always with wooden barrels. Now they've pro-

duced the American EcoWriter that looks, feels, and writes like a pencil, but is made from recycled cardboard and newspaper.

With 70-plus million tons of wastepaper hitting the waste stream each year, a few million pencils will not, EF admits, "solve the whole recycling problem." But each new product that incorporates recycled material fills in a blank spot in a pattern that will eventually see us getting much more use out of each natural resource we harvest. If all the 2 billion pencils we use each year were made from recycled paper, it would certainly put a dent in the garbage mountain.

Price-wise, recycled pencils are comparable or slightly more expensive than virgin wood. Ecowriter is available in most places you'd expect to find pencils — department stores, stationers, and office-supply outfits.

Recycled Fax Paper

WELL, THE OFFICE IS coming together nicely — now how about some recycled fax paper? Many paper mills are now incorporating at least a token amount of post-consumer fiber in their fax paper. But JP Atlanta has gotten its hands on fax stock that's 80 percent post-consumer paper, and 20 percent industrial scrap.

The paper sold slowly at first, due to the usual price problem. But JP Atlanta has dropped the price to jumpstart the market, and it's working. At \$35 to \$45 for a carton (six small-diameter rolls), a spokeswoman says customers "can't come up with another reason for not buying it." As for performance, in my machine the only difference I noted was that it feels stronger and less crinkly than my old brand.

You can buy it directly from JP Atlanta, Dept. GM, 1625-M Rock Mountain Blvd., Stone Mountain, GA 30083; (800) 874-1905.

RESOURCES

The Diversity of Life

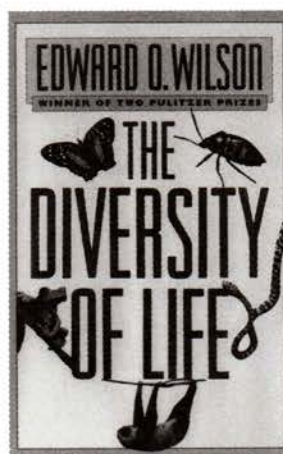
by Edward O. Wilson.
424 pages. Belknap Press/
Harvard University Press,
79 Garden St., Cambridge,
MA 02138; (800) 448-2242.
Hardcover, \$32.95 ppd.

IT'S A BIG BOOK, AND I thought I would skim it. But that wasn't possible: A sentence would catch me, and I found myself plowing through 424 of the most fascinating pages I've ever encountered.

Dr. Wilson's latest book is an encyclopedic definition of that increasingly common term, "biodiversity."

Briefly defined, it's a census of the Earth's inhabitants. But a proper introduction to the concept takes hundreds of pages.

Dr. Wilson doesn't mind giving the basics all the



words they need. But even as he builds for you a foundation in genetics, evolutionary theories, the development of new species and ecosystems, you will be spellbound. His style is so leisurely, so conversational,

so warmly illustrated with stories of real critters in real life, that the lessons go down like good fairy tales.

By the time he gets to the question of why we want all this teeming, boiling life around us (much of it quite small — Dr. Wilson's first love is ants), you'll wonder why he even needs to ask: We want it because it's life. In just 424 gentle and immensely informed pages, he has planted in you a love of things you can't even pronounce ("mycorrhizal fungi," for example). His passion

for biodiversity raises this work from textbook to literature. But his role as scientist is not lost: With some fascination, he relates the results of an experiment in which he insecticide-fogged a series of small islands so he could chronicle the return of life.

.....

The Naked Consumer

How Our Private Lives Become Public Commodities

by Erik Larson. 275 pages.
Henry Holt and Company,
4375 West 1980 South, Salt
Lake City, UT 84101; (800)
488-5233. Hardcover, \$26 ppd.

NUMBER OF PEOPLE called by telemarketers each day: 18,000,000.

Number of marketing messages each of us encounters per day: 3,000.

Total number of pregnant women whose due dates are recorded in Metromail's "Young Family Index" without their knowledge: 900,000.

Number of names rented to direct-marketing companies in 1990: 38,020,000,000. Erik Larson digs into the marketing machine with gleeful curiosity, only occasionally betraying feelings of revulsion. Take, for instance, the campaign that sent people "newspaper clippings" about anti-aging cream and [Cont. on p.56]



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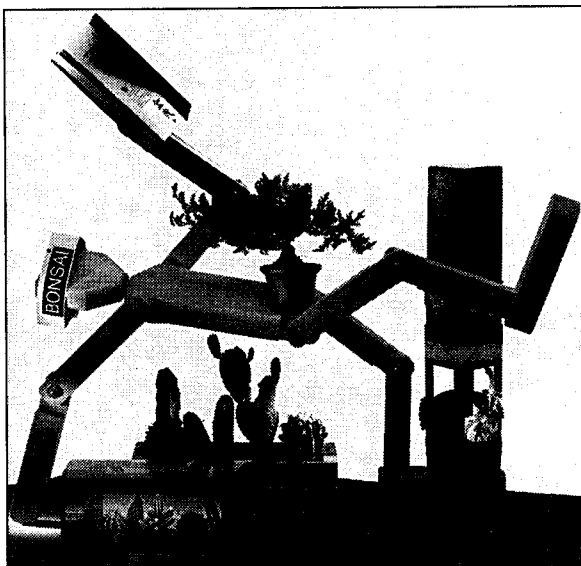
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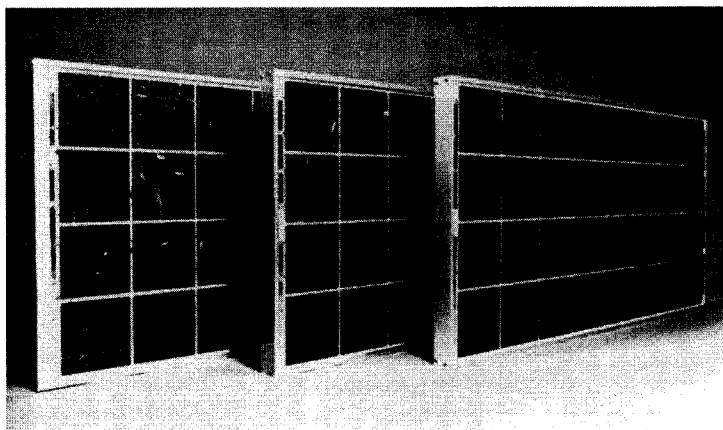
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[Cont. from p.54] other products, affixed with a note such as, "Kathy — Try it. This works. R." Many recipients blamed relatives and friends for an insulting piece of mail. Marketing can hurt.

But more often, Mr. Larson notes, it simply encourages our knee-jerk consumption of resources and invades our privacy. If you thought the Census Bureau had a lot on you, what the "consumer intelligence community" has gathered may make your skin crawl. Mr. Larson cites companies that specialize in identifying gays, lesbians, short men, religious zealots, people with lower-back problems, and those who just received

and phone numbers.

Mr. Larson looks at the cutting edge of consumer intelligence gathering, which includes cameras that monitor TV-watching behavior and shopping cards that record a shopper's purchases for further study. He closes with some public-policy recommendations.

Although Mr. Larson achieves a lighthearted tone, the seriousness of the subjects comes through. You'll never again reveal your credit card with such innocence.

....

Likeable Recyclables

Creative Ideas for Reusing Bags, Boxes, Cans, and Cartons

by Linda Schwartz,

illustrated by Bev Armstrong.

128 pages. The Learning Works, P.O. Box 6187, Santa Barbara, CA 93160.

Softcover, \$12.95 ppd. Californians add sales tax.

THE LEARNING WORKS knows kids. *Likeable Recyclables* guides their romping creativity through the manufacture of dozens of toys, games, and gifts using empty cans and bottles, scraps of cloth, cardboard boxes and tubes, and an "odds and ends collection," a great way to teach children to save things that might be useful in the future.

In addition to the classic steel-can stilts and walkie-

talkies, your budding artists will find directions for making a castle, a soda-bottle greenhouse, egg-carton puppets and flowers, baskets, beads, doll houses, a periscope, and much, much more. The instructions are simple and clear, and the illustrations are fun. This is a powerful package of rainy-day salvation if ever I saw one.

....

The Moon by Whale Light

And Other Adventures Among Bats, Penguins, Crocodilians, and Whales

by Diane Ackerman.

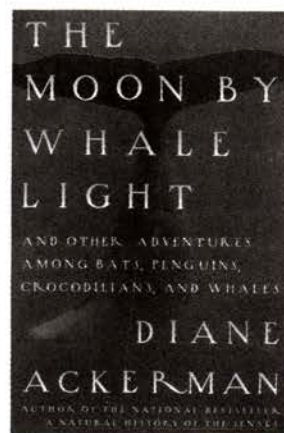
249 pages. Vintage Books, Random House, attn. orders, 400 Hahn Rd., Westminister, MD 21157; (800) 733-3000. Softcover, \$11 plus your state tax and \$2 shipping.

ON THE LIGHTER SIDE, Diane Ackerman's new book focuses on just four families — bats, crocodilians, whales, and penguins. Ms. Ackerman is a nature writer, but she's also very much a people writer.

Her essays in this collection explore a triangle between herself, a creature, and another person whose life revolves around the creature. This approach creates a fuller picture of the way life works, and prevents the innocent from projecting all sorts of mushy nonsense on animal behavior: The spe-

cialists become the heavies who let you know that a whale that raises its flipper is not waving to you, but simply amusing itself.

Nonetheless, when you're finished with an essay, you do feel you've been to the bat cave, sat on a crocodile,



or swum with the whales. With a self-consciousness that's almost awkward, Ms. Ackerman passes on her feelings along with her sensory experiences when she has a close encounter, like this one with a whale:

"Her dark, plumlike eye fixed me and we stared deeply at one another for some time. The curve of her mouth gave her a Mona Lisa smile, but that was just a felicity of her anatomy. The only emotion I sensed was her curiosity. That shone through her watchfulness..."

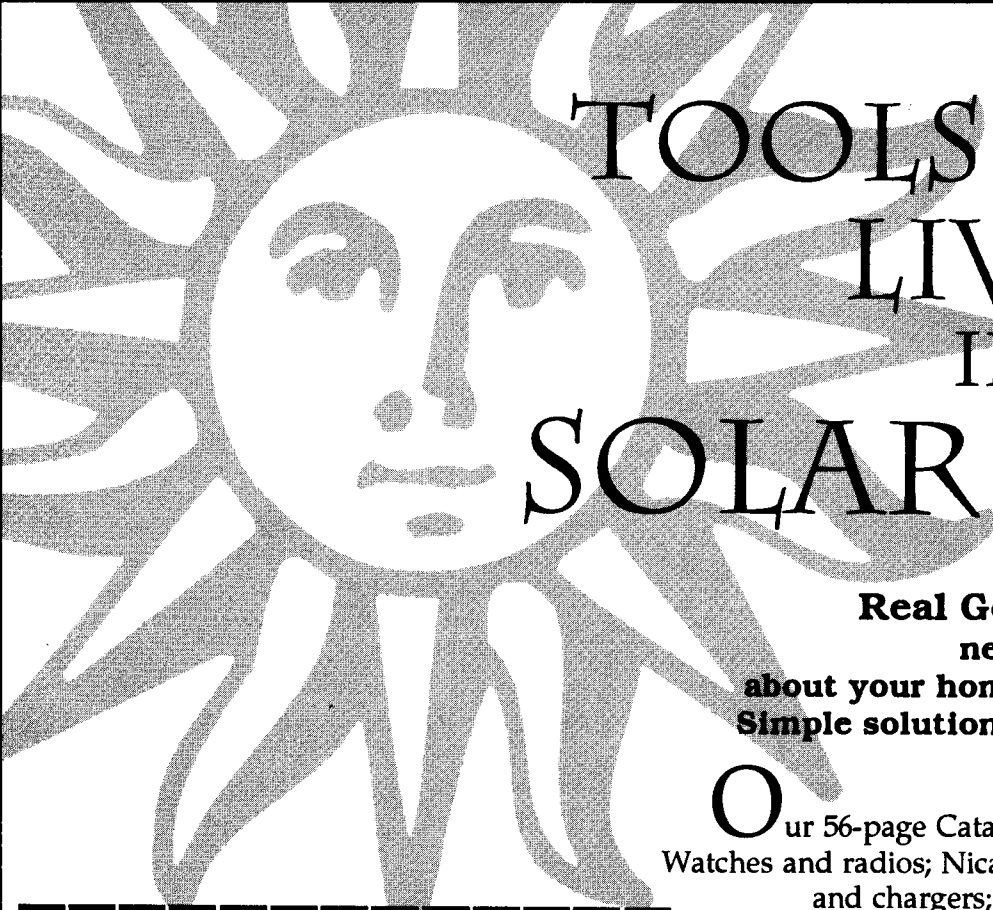
P.S. If you like *The Moon by Whale Light*, you'll love *A Natural History of the Senses*, in which Ms. Ackerman turns her thoughtful, very human eye on the five human senses.

— Reviews by
Hannah Holmes



credit cards, in addition to pregnant women. Naturally, we are sorted by age, race, ethnicity, and gender, as well as by zip code.

And what do they do with all this information? It's compiled in lists, and for \$40 to \$70 per thousand, another company — usually a direct-mail firm with something to sell — can buy our names, addresses,



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The New Coffee (Mug) Generation

The conference center I work at wants to choose the right mugs for our guests. Are there any companies that manufacture mugs made from recycled plastic?

WILLIE PICARO

Abiquiu, New Mexico

PERMANENT MUGS MADE FROM RECYCLED plastic sound like a great idea. Reusable mugs cut down on garbage from throw-away cups, a lot of recycled plastic is itself recyclable, and buying recycled products helps build markets for collected plastics, a crucial step in making recycling work.

Because chemical contaminants from plastic jugs that once contained motor oil, solvents, etc. could be recycled along with recycled plastics, the Food and Drug Administration has been wary about allowing manufacturers to use post-consumer recycled plastic in food containers. (See "Ask Garbage" Dec/Jan '93.) Even if the FDA did approve such uses, manufacturers wouldn't be eager to assume liability for food-service products (especially one carrying hot liquids) in an era when trace contaminants are measured in parts-per-trillion and litigation is a national pastime. Anyone who got sick after drinking from a cup made of tainted post-consumer plastic could sue the manufacturer; and in many cases the burden of proof would be on the manufacturer to show that their product did not cause the sickness.

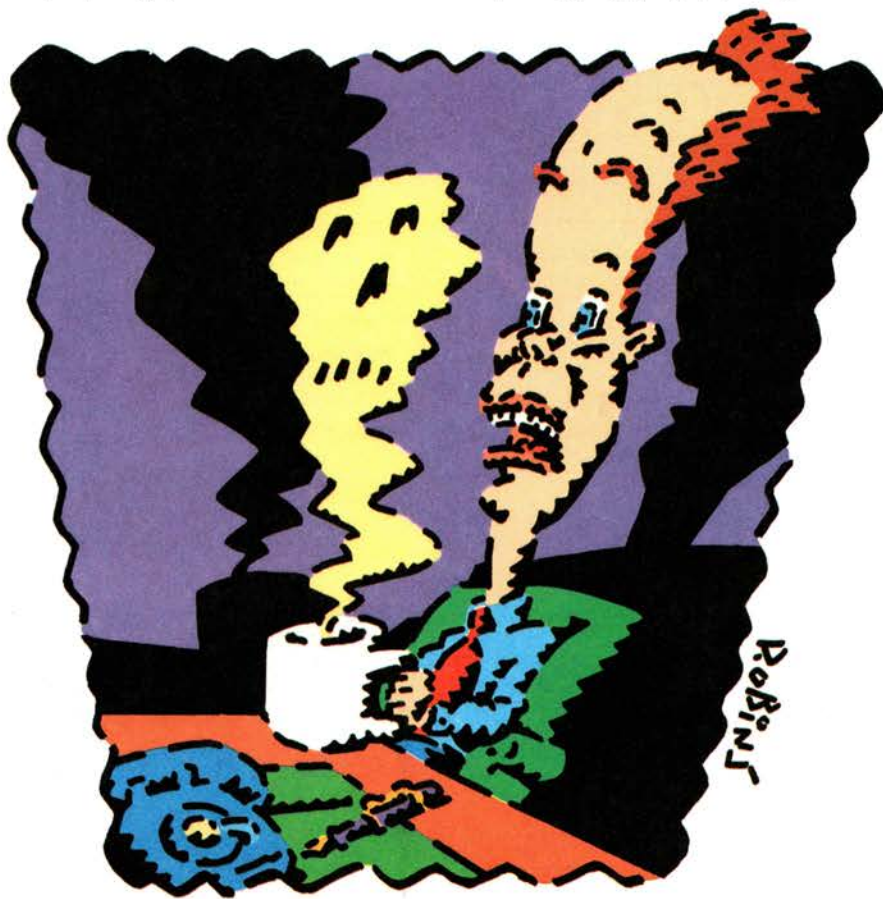
Therefore, recycled plastic mugs do not contain post-consumer plastic. They do contain "in-house plant trimmings": scraps and shavings off the factory floor, and defective products. The manufacturers know exactly where the plastic has

been and the FDA treats it as if it were virgin material.

Signature Marketing sells 14 oz. acrylic mugs with a minimum of 20 percent post-industrial recycled content. (They will do one-color imprints of your company's logo.) The minimum order is

150. Travel lids and coasters are available, but they're not made with recycled content. Contact Signature Marketing, 134 West St., Simsbury, CT 06070; (203) 658-7172.

Weisenbach Specialty Printing, Inc. will put your logo on 14 oz. and 10 oz. recycled acrylic mugs or 12 oz. recycled polypropylene with 50-100% recycled content. The polypropylene mugs come with no-spill covers and dashboard adhesive on the base. They're cheaper than the acrylic, and look it. Minimum orders of 75. Contact Weisenbach Specialty Printing, Inc. 342 S. Washington Ave., Columbus, OH 43215; (614) 464-2223.



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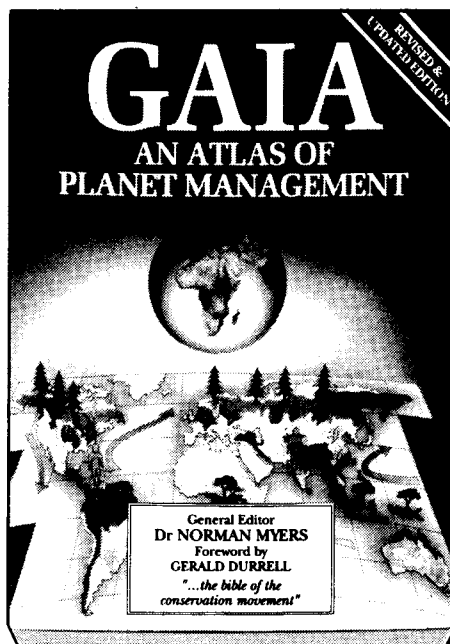
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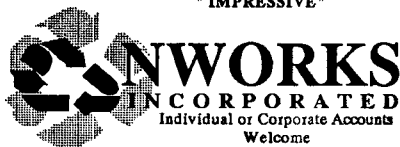
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In the Dark over Green Lights

I got so excited by your "Green Lights" article (Oct/Nov '92) that I rushed out and purchased several different compact fluorescents. Then I discovered they do not fit in most of the lighting fixtures in our home. Any solutions?

GREG LAPIC
Longview, Wash.

FIRST, LET'S CLARIFY THE PROBLEM: COMPACT-fluorescent bulbs are often longer or wider than standard incandescents. The problem is not that the bulbs won't screw into a standard socket. They will. But the harp on many lamps — the wire arc that lampshades sit on — is too small or too narrow to accommodate the oversized bulbs.

The solution is to get a larger harp: Hardware stores sell different sizes. They generally run between \$1.50 and \$4. You may have trouble prying the old harp loose from the lamp base. Try a little lubricating oil and a few taps with a hammer.

Glass shades that screw directly onto the lamp, and ceiling or wall fixtures that enclose the bulb, present tougher obstacles. Unfortunately, most just aren't large enough to accommodate a CF.

The Real Goods catalogue offers a mail-order solution. In addition to a wide array of compact fluorescents, the catalogue includes actual-size silhouettes you can cut out to see if the bulbs will fit your fixtures. This is much cheaper than testing the fit with \$20 bulbs. Real Goods also sells oversized harps, a compact fluorescent ceiling fixture (requires hard wiring), and a special CF with the ballast mounted to the side of the socket so that it will fit under many incandescent-size harps. Contact Real Goods, Dept. GM, 966 Mazzoni St., Ukiah, CA 95482-3471; (800) 762-7325.

Smelly Copy Machine

I work in a 10-by-15-foot room with a photocopier that gets heavy use. When the machine is running for several minutes it emits a strange odor. Is this harmful? Ventilation is not great in the winter months.

ZOE GILBORN
Boston, Mass.

THE SMELL YOU'RE GETTING IS PROBABLY ozone gas (the air-pollution type, not the upper stratospheric ozone).

Almost all xerographic copy machines produce ozone as a by-product of the copying process. Most come equipped with ozone filters to keep emissions down, but these can become clogged and ineffective. Ozone becomes a real health risk at 0.25 parts-per-million in air. According to the Canadian Centre for Occupational Health and Safety, a poorly maintained machine, even in an unventilated room, rarely achieves levels higher than 0.1 ppm. Still, ozone can be an irritant at lower levels and prolonged exposure can cause headaches, nausea, eye and upper-respiratory irritation. (Ever been stuck in a tunnel at rush hour? Same feeling.) You shouldn't work in a small unventilated room next to a copy machine.

Ozone is a gas produced whenever an electrical charge interacts with oxygen and causes oxygen molecules (O₂) to gain an extra molecule and become O₃. (Ozone is responsible for that "fresh" smell people associate with electrical storms. Is that the "strange odor" you mean?) Most copy machines involve a process where just such an interaction occurs: a metal drum is given a positive charge from something called a corona discharge wire.

Ozone lingers longer in dry air than in humid, which makes winter ventilation even more important (especially in the Northeast). Make sure the ozone filter is regularly maintained and convince the boss to adequately ventilate your office. Of course, the best thing would be to put the copier in a room by itself.

There are other ways a poorly maintained copier could pose risks: Your machine's collection system for waste toner could back up, spewing toner dust through its fan; or organic chemical vapors could be coming off the heated drum. Again, make sure the machine is regularly maintained.

For a packet of information on the health risks posed by copy machines, contact the National Institute for Occupational Safety & Health, Technical Information Branch, Robert A. Taft Laboratories, 4676 Columbia Parkway, Cincinnati, OH 45226-1998; (800) 356-4674.

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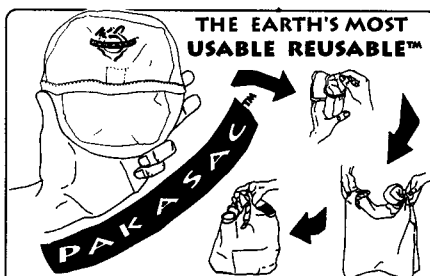
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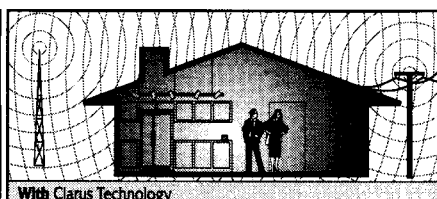
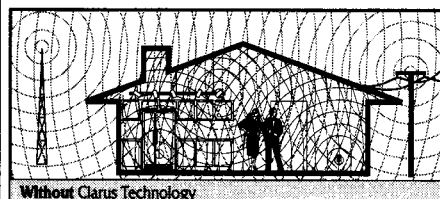
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DR. DAVID CARPENTER, Dean of the State University of New York
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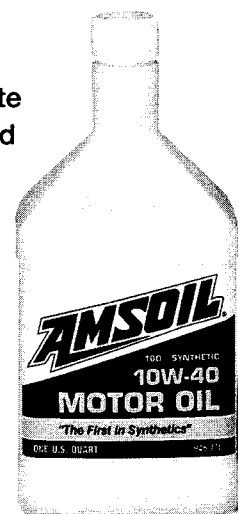
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Media Meltdown


LISTENING TO A WELL REGARDED ENVIRONMENTAL PROGRAM on the radio last winter, I heard the commentator take on the nuclear industry for the "deceit" behind its new PR campaign: "The ads boast that nuclear energy doesn't pollute the air. Now that may be technically correct, but it completely avoids the huge problem ... of what happens when accidents occur. You know, the ones they assured us could never happen. But when they do, the cancer rates in the vicinity soar, and the entire region's landscape is blighted for who knows how long. Accidents like Chernobyl." The commentator's reporting might be, uh, "technically correct" regarding Chernobyl. But her piece was focussing

on the nuclear industry in the *United States*. In fact, there is no documented evidence of increased cancer rates resulting from this nation's worst accident, at Three Mile Island in 1979.¹ There has never been an accident at a U.S. nuclear reactor which has blighted the landscape.

The facts: People living within 50 miles of TMI were exposed to about 1.5 millirems² of radiation. (The average annual dose for a U.S. resident is 360 millirems, from background radiation.) Of quite a different magnitude is the widely accepted estimate that, over the next 50 years, 17,000 people will die from cancers induced by Chernobyl's runaway nuclear reaction.³

Evidently, then, Chernobyl does not equal Three Mile Island.

IT'S NOT THAT I THINK THE "LIVING ON Earth" radio commentator had no legitimate quarrel with the PR campaign. Certainly, she had reason to critique the nuclear industry's worker-safety record, as well as their avoidance of the unresolved issue of radwaste disposal. But why hype the commentary with blighted landscapes and soaring cancer rates? "Living on Earth" is generally an excellent environmental program, yet even the best resort to hyperbole when nukes come up.

Reporting that diverts us from rational, informed debate about energy options fuels the public's nuclear phobia. And it belongs in the dumpster. 

¹ According to the Penn. Dept. of Health.

² A millirem is a measure of radiation dose in terms of its effect on humans.

³ Reported in *Nuclear Choices* (MIT Press) by Middlebury physicist Richard Wolfson.



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"Subtitle D" is a section of the federal Resource Conservation and Recovery Act (RCRA), which sets out the ABCs of garbage regulation. Covering MSW and all remaining rubbish, including the XYZs of industrial refuse, mining waste, waste from agriculture, waste from oil and gas exploration and refining, sewage sludge, coal utility ash, etc., Subtitle D adds up to more than 11.4 billion tons, according to EPA's last guesstimate.

However ... RCRA, with classic bureaucratic disregard for linguistic logic, includes some kinds of industrial waste water in its definition of solid waste. About 7.37 billion tons of Subtitle D waste (or 97 percent of industrial solid waste) is actually liquid; 228 million tons is solid.

At best, Subtitle D stats are *approximations* of the nation's entire non-hazardous waste stream. Nevertheless, the term clarifies statements about this or that product (ie., diapers or aerosol cans) comprising x-percent of "all waste." What is usually meant is x-percent of all garbage-truck waste (MSW).

